amateur radio

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SEPTEMBER
1967

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,, 2064 Voltage Doubler, 340, 315v. d.c. 125 mA., 6.3v. c.t. 2.25a. $8.75
,, Voltage Doubler, 310, 285, 260v. d.c. 100 mA., 6.3v. c.t. 4a. $8.35

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3¾ INCH REELS

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1200 ft. Mylar, 0.5 mil. $3.25
1800 ft. Tensilised Mylar, 0.48 mil. $5.00

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850 ft. Acetate, 1.5 mil. $1.95
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2	12	25c	50	350	70c
4	350	40c	50 plus 50*	350	$1.35
4	500	45c	100	6	30c
5	6	25c	100	12	30c
5	12	25c	100	15	30c
8	350	45c	100	25	45c
8	500	50c	100	50	55c
10	6	25c	100*	200	85c
10	12	25c	100	350	$1.45
10	25	30c	100 plus 50*	400	$2.00
10	50	30c	200*	350	$1.70
16	350	45c	250	6	30c
16	450	55c	250	12	45c
16	500	65c	250	15	50c
24	350	50c	250	25	50c
24	500	80c	250	50	85c
25	25	30c	500	6	45c
25	50	35c	500	12	65c
30	6	25c	500	15	65c
30	12	25c	500	25	70c
32	350	65c	500	50	$1.15
32	500	95c	1000	15	85c
50	6	30c	1000	25	$1.20
50	12	30c	1000	60	$1.25
50	15	30c	2000	15	$1.00
50	25	40c	2000	25	$1.35
50	50	40c	* P.V.C. can type		

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,, 3: 8 in. x 5 in. x 2½ in. $1.00
,, 4: 10 in. x 6 in. x 2½ in. $1.25
,, 5: 11 in. x 8 in. x 2½ in. $1.50
,, 6: 13 in. x 7 in. x 2½ in. $1.50
,, 7: 13 in. x 10 in. x 2½ in. $1.75
,, 8: 17 in. x 8 in. x 3 in. $2.15
,, 9: 17 in. x 10 in. x 3 in. $2.46
,, 10: 17 in. x 12 in. x 3 in. $2.62
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★

Members of the W.I.A. should refer all enquiries regarding delivery of "A.R." direct to their Divisional Secretary and not to "A.R." direct. Non-members of the W.I.A. should write to the Victorian Division, C/o. P.O. Box 36, East Melbourne. Two months' notice is required before a change of mailing address can be effected. Readers should note that any change in the address of their transmitting station must, by P.M.G. regulation, be notified to the P.M.G. in the State of residence; in addition, "A.R." should also be notified. A convenient form is provided in the "Call Book".

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W.I.A. OFFICIAL BROADCASTS

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VK2WI, Sundays, 1100 hrs. E.S.T.

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VK3WI, Sundays, 1030 hrs. E.S.T.
1825 Kc. a.m. 144.5 Mc. a.m.
3600 Kc. s.s.b. 145.854 Mc. f.m.
7146 Kc. a.m. 432.5 Mc. a.m.
53.032 Mc. a.m.

QUEENSLAND
VK4WI, Sundays, 0900 hrs. E.S.T.
3580 Kc. 53.995 Mc.
7146 Kc. 144.36 Mc.
14.342 Mc.

SOUTH AUSTRALIA
VK5WI, Sundays, 0900 hrs. C.S.T.
3.5, 14, 52 and 144 Mc. bands

WESTERN AUSTRALIA
VK6WI, Sundays,

TASMANIA
VK7WI, Sundays, 1000 hrs. E.S.T.
3672 Kc., and re-transmitted by representative stations on—
7146 Kc. 144.1 Mc.
53.032 Mc. 432.6 Mc.

CUSTOMS DUTY

FEDERAL COMMENT

LAST year, before he journeyed overseas, our then Federal Treasurer (Kevin Connelly, VK3ARD) began to collect some data relating to the incidence of customs duty on imported s.s.b. equipment. Together with other members of Executive he also investigated the availability of Australian made equipment which would comply with a standard of design, finish and construction equal to imported units.

Independently of this action, and on their own initiative, Sandy VK9GC and Ted VK9TB approached the Customs Department of Papua and New Guinea with a case for the reduction in duties on commercial radio equipment imported into the Territory. The Customs Department of Papua and New Guinea is completely separate from that of Australia and it has agreed to waive all import duties on communications type radio receiving apparatus where it is being imported into the Territory of Papua and New Guinea by a licensed Radio Amateur, under certain conditions, viz.:—

> The Amateur licence must be produced by the licensee/importee and a declaration must be signed whereby the licensee/importee undertakes that the equipment is not for re-sale and is for the personal use of the importee only.

In making these representations, Sandy and Ted pointed out that the receiving apparatus under question was not designed for entertainment purposes, but for serious non-commercial radio experiments and communications, and the particular equipment in this case was designed for s.s.b.

Meanwhile, back in Australia, Federal Executive had passed on to Allen Fairhall, VK2KB, the file on Customs matters and he agreed to make application to the Minister for Customs and Excise on behalf of the W.I.A. for "By-Law admission" of s.s.b. equipment for Amateurs.

It should be stated at the outset that in Australia it is the policy of our Government to afford tariff protection for the express purpose of protecting Australian manufacturers who find themselves at an economic disadvantage against overseas suppliers. This has long been the policy of Australian Governments, and the Tariff Board—a statutory Board which advises the Government in matters relating to trade and customs—has expressed the key principles as follows:

> "The Tariff Board recommends assistance, when necessary, to industries on the basis of their being **economic and efficient** and showing sound prospects for success." Ref. Tariff Board; Annual Report 1958/9 p. 9.

Over the years, the Board has built up a scale of maximum rates considered appropriate for various types of industry, and although the Board has always resisted the invitation to state what is meant by "economic and efficient" assistance would be given to industry which, for instance, aids de-centralisation, creates opportunities for manufacturing employment, or which uses Australian inputs, or which saves foreign exchange, or which contributes to defence, or whose development is in accordance with Government policy, etc.

On those bases, protection in the form of Customs Tariff on imported equipment has long been given to the Australian radio and electronics industry. The situations that exist in Papua and New Guinea and in Australia are therefore, on many grounds, vastly different.

Nevertheless, in the representations to the Australian Minister for Customs and Excise, on behalf of W.I.A., it was pointed out, among other aspects, that the Amateur Service went beyond a scientific hobby. Rather, it provided an avenue through which radio technicians and scientists could in their own time, and at their own expense, become experienced in advanced electronic techniques ahead of the general application in civilian and the defence fields.

Reference was made to the number of high executive and scientific positions filled by Amateurs in the community, and also to the number of Amateurs who are currently research and design officers for nearly all radio manufacturers. The value of the Amateur Service as a means of supplementing normal channels of communication in emergencies, and its defence significance, were cited as additional reasons for the encouragement of our activities.

The limited spectrum space and consequent band-crowding which has led to the need for development of narrow bandwidth techniques was given as a reason for the increased demand for s.s.b. equipment. This equipment was described as being of necessity, very well engineered, also expensive and of a type which must continue to be imported for some time yet. The incidence of duty and sales tax was making the cost of s.s.b. equipment prohibitive for non-commercial operation by Amateurs and was tending to discourage the use of s.s.b. and limit the opportunities for familiarisation with the mode.

The Minister was requested to consider that if the case **against** duty free admission was marginal, then the matters referred to above should carry some weight. He was also acquainted with the fact that Federal Executive of the W.I.A. had canvassed the Australian electronics industry to ascertain the possibility of supplying suitable Australian made equipment, without significant result. The only source of supply quoted a price in excess of the duty paid price of comparable imported equipment, with a long delay in filling orders, and a "one off" approach to manufacture. It was submitted that the response to our enquiries indicated no possibility of development of local manufacturing capacity.

There is a need to encourage Australia's industrial capacity—this is freely admitted—but it seems clear that efficient local production of soundly engineered equipment must await a quantity demand. This in turn would be best encouraged by duty free admission of imported equipment subject to review from time to time. In essence, that was the submission which was presented recently to the Minister for Customs and Excise on behalf of the W.I.A. by Allen Fairhall, VK2KB.

With considerable regret, we state that the Minister for Customs and Excise has rejected the application for by-law admission of s.s.b. equipment for Amateurs. Rejection of the application was clearly based on the nature of the use of this equipment by Amateurs and the fact that there is available from Australian sources equipment which might be regarded as reasonably equivalent.

The Minister, referring to representations, re-iterated that the usual considerations governing by-law admission were that:—

1. Suitably equivalent goods of Australian manufacture are not reasonably available, or if waiver of preferential Tariff margins is involved, suitably equivalent goods of British and Australian manufacture are not reasonably available;
2. The goods are for an essential purpose.

He indicated that he was in accord generally with the view put on the desirability of encouraging the activities of Radio Amateurs. However, he found difficulty in accepting that in all cases normal pursuit of our hobby constituted an essential purpose as envisaged in the by-law legislation. Information was obtained by the Minister that there is a Company in Australia currently supplying s.s.b. equipment under Government contract for civil defence use, thus, for purposes of by-law administration, suitable equivalent goods of Australian manufacture were deemed to be reasonably available!

Hence, he felt that the by-law provisions of the Customs Tariff were not the appropriate means of according the Amateur Service encouragement and assistance.

So, notwithstanding the efforts of Federal Executive and notwithstanding the wonderful advocacy of Allen Fairhall, VK2KB, the status quo is maintained in Australia. Rather than have a mass migration of s.s.b. enthusiasts to Papua and New Guinea, we will reapproach the matters, perhaps on appeal, and perhaps from some other point of view, in the near future.

JOHN BATTRICK, VK3OR,
Federal Secretary W.I.A.

Note.—Correspondence or comments on the above matter should be directed to the Federal Secretary at his private box—P.O. Box 365, Frankston, Vic., 3199.

SOLID STATE H.F. CONVERTERS

HAROLD L. HEPBURN, VK3AFQ*

THIS is a further article in the series on the Moorabbin and District Radio Club transistorised receiver project that has appeared in these pages over the last year.† It presents a design for h.f. converters suitable for use with the original 3.5-4.0 Mc. receiver but which can be used with any other receiver having the appropriate tuning range. Other tunable i.f's can be used by simple changes to crystals and coils. Suggestions are made later in the article.

To a very large extent the h.f. converters have been developed in collaboration with the v.h.f. section of the VK3 Division who, concurrently, have been working on transistorised converters for the v.h.f. bands.

It had been hoped that a full description of a 52 Mc. "F.E.T'ised" converter would have appeared in this issue of "A.R." as a companion article. However, other commitments made such a desirable course of action impossible, but it is anticipated that the article will appear in the near future.

In keeping with the orginal concept of the Moorabbin receiver project the aim has been to produce a series of h.f. converters which are complete in themselves, simple to build and get going, which use parts which are freely available in Australia, which can be used with any tunable "back end" and which are adaptable to other i.f. ranges.

"FET" TRANSISTORS

Reference to the circuit diagram—Fig. 33—shows that for the r.f. and mixer stages use has been made of 2N3819 "N" channel field effect transistors. In r.f. amplifier and mixer service FET's have several advantages over the bi-polar transistor, the most notable being their higher input impedances and their ability to handle quite large signals before cross modulation occurs. The higher input impedances and the fact they are voltage operated devices, frees the user from the compromises between coil efficiency and power transfer which are necessary with bi-polar transistors. In (very!) general terms a field effect transistor can be looked upon as a low voltage substitute for a valve. Indeed some work recently done by one of the club members has shown that in the case of an old A.W.A. battery operated "Mod. Osc." direct replacement of the oscillator valve by a 2N3819 worked excellently. Further experiment showed that the Type 10 crystal calibrator could be completely "FETised" with a substantial improvement to its h.f. performance.

So far as noise figures are concerned the real impact of internally generated noise only becomes felt over about 20 Mc. and—within reason—is of lesser importance in h.f. than in v.h.f. converters and front ends. Suffice it to say that the 2N3819 can be used at 432 Mc. with noise figures that are an improvement on the valve types normally used at those frequencies.

THE CIRCUIT

Reverting to the circuit diagram, it can be seen that a low impedance (50-70 ohms) winding transfers the incoming signal to the tuned circuit (L2/C2) in the gate of the first 2N3819. After amplification a double tuned circuit (L3/C3, L4/C4) couples the signal to the gate of the 2N3819 mixer stage. It may be argued that a single tuned circuit might have been used, but it was felt that the double circuit did enable a greater degree of control to be exercised over the passband.

Since the r.f. stage is virtually equivalent to a triode valve r.f. amplifier it has been necessary to neutralise it. A bridge configuration has been used to avoid the need for coil tapping. It is recommended that, initially, a 3-30 pF. trimmer be used at Cn and the limits between which it is effective determined. Subsequently, the variable can be replaced with a disc ceramic of the correct value.

The oscillator circuit is quite straightforward and requires little comment.

The output of the mixer is at 3.5 Mc. and a pi-network is used to couple to the output socket. Normally L5 is peaked up in the centre of the band and should require no adjustment except when the length of the co-axial lead to the tunable i.f. is changed.

The complete unit is mounted on a 4" x 2½" printed circuit board which uses d.c. supply rails which are earthed for r.f. by liberal use of decoupling condensers. The r.f. grounding is to a central earthy mat. This technique

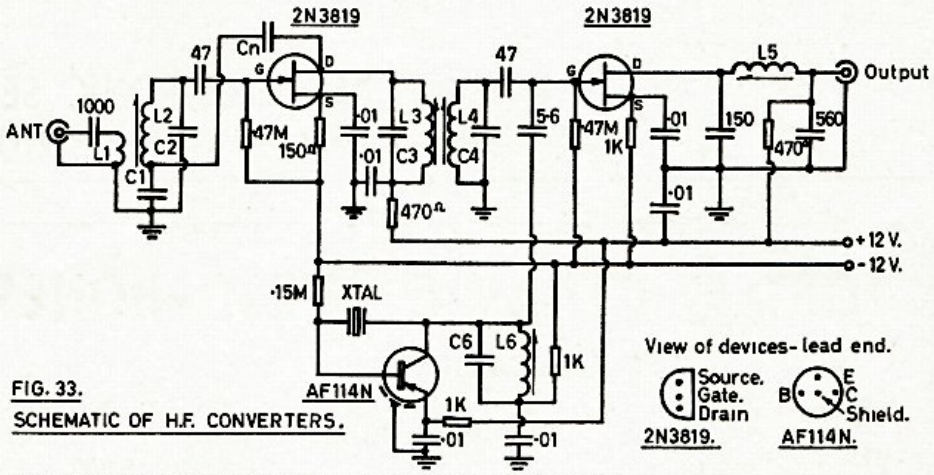


FIG. 33.
SCHEMATIC OF H.F. CONVERTERS.
MOORABBIN & DISTRICT RADIO CLUB-RECEIVER PROJECT.

Band	L1	L2/L3/L4	C2/C3/C4	L6	C6	L5 (for 3.5 Mc. I.F.)	Crystal Freq. (for 3.5 Mc. I.F.)
80	4 turns 35 B. & S.	50 turns 35 B. & S. F16 core	68 pF.	—	—	—	—
40	3 turns 35 B. & S.	30 turns 35 B. & S. F16 core	39 pF.	29 turns 29 S.W.G. F16 core	47 pF.	60 turns 35 B. & S.	11.00 Mc.
20	2 turns 29 S.W.G.	29 turns 29 S.W.G. F16 core	22 pF.	29 turns 29 S.W.G. F16 core	47 pF.	60 turns 35 B. & S.	10.50 Mc.
15	2 turns 29 S.W.G.	25 turns 29 S.W.G. F29 core	15 pF.	25 turns 29 S.W.G. F29 core	22 pF.	60 turns 35 B. & S.	17.50 Mc.
10	2 turns 29 S.W.G.	20 turns 29 S.W.G. F29 core	10 pF.	15 turns 29 S.W.G. F29 core	22 pF.	60 turns 35 B. & S.	24.50 Mc.

Table 1.—Coil Data.
Note that the data for all r.f./mixer coils for 80 metres has been included to assist those using other than a 3.5 Mc. i.f.

* 4 Elizabeth St., East Brighton, Vic., 3187.

† "A.R.," August 1966, page 2.
"A.R.," September 1966, page 2.
"A.R.," October 1966, page 11.
"A.R.," November 1966, page 7.
"A.R.," March 1967, page 8.
"A.R.," June 1967, page 5.

enables the converter to be used with either supply rail connected to real earth.

All coils are wound on Neosid Type 722/1 bakelite formers (approx. 3/16" diameter) and use either F16 or F29 screw cores. Full coil winding data in given in Table 1.

A.g.c. can be applied to the earthy end of the 470K gate resistor of the r.f. FET, but it is suggested that a separate r.f. gain control is preferable, and can be obtained by returning the earthy end of the r.f. source resistor (150 ohms) to the slider of a potentiometer across the supply rails.

Checks made on the 14 Mc. prototype of these converters showed it to have a sensitivity of better than 0.5 uV. on a.m. and roughly half this value on c.w. The noise figure at 14 Mc. was 7 db.

The current drain of the unit is 14.0 mA. at 12 volts. The r.f. stage draws 7.0 mA., the mixer 3.0 mA. and the crystal oscillator 4 mA.

ADJUSTMENTS

Getting the converter on tune is fairly straightforward. Check that the crystal is oscillating with a receiver that covers the appropriate frequency. Adjust L6 until the crystal output is heard. Peak the r.f. coil (L2) and the output coil (L5) in the centre of the band. Peak L3 at the high end of the band and L4 at the low end of the band. You may find L3 quite "broad". The neutralising procedure was outlined earlier in this article.

CHANGING THE I.F.

Although these converters have been designed for use with a 3.5-4.0 Mc. tunable i.f., they can be changed to other i.f. ranges quite easily. No modifications are necessary to the r.f. and mixer gate coils but L6/C6 and the output coil L5 will need to be brought on to the new operating frequencies. In the event that the new tuning range is between 2.5 and 6 Mc., no change will be necessary to L5—only the core will need re-peaking.

On 28 Mc. only one crystal will be needed if the tunable i.f. covers 3.5-5.5 Mc. but in the event that only a 500 Kc. band is available, some crystal changing will be needed.

KITS AVAILABLE

As has become the custom over the past 12 months, the Moorabbin and District Radio Club will be pleased to assist those interested in making these converters. Full kits of parts including crystal, printed circuit boards, full instructions and diagrams will be available from the beginning of September 1967 at $18.00 post paid or $13.00 less crystal. Printed circuit boards, instructions and all diagrams will be available separately at $2.00. Boards only will be $1.00.

Enquiries should be addressed to the Hon. Secretary, 4 Elizabeth St., East Brighton, Vic., 3187.

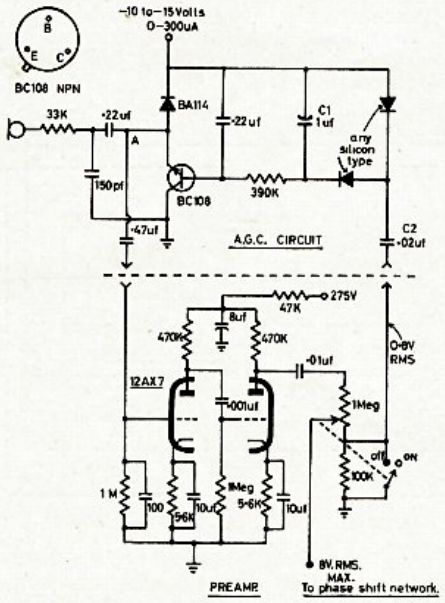
A SIMPLE SILICON A.G.C. CIRCUIT

CLEM MALOOF, VK2AMA*

This is a description of a solid state a.g.c. system freely adaptable to existing audio amplifiers and providing 40 db. compression capability at negligible harmonic distortion.

Using it, the writer is able to maintain maximum sideband output from his phasing rig without the more modern refinement of an automatic load control system. It is but necessary to set the a.f. gain control to the drive required to just produce flat topping in the r.f. envelope pattern as displayed on a c.r.o. or a calibrated output meter. From then on the a.g.c. takes over.

In the writer's shack speech will fully modulate the final and reliably pull in the v.o.x. at two feet from the microphone. Even close shouting fails to cause over-drive and subsequent splatter. No critical adjustment is necessary as long as r.f. is kept out, ground loops are avoided, and the d.c. supply is adequately filtered — conditions necessary for all transmitter low level a.f. stages.



No longer will it be necessary to ride the a.f. gain control when visitors speak or when the OM is obliged to squeeze all he can out of the final to punch through QRM to reach the DX. An a.g.c. system smooths out v.o.x. operation also.

Basically the principle employed is to shunt the input to the pre-amplifier with a silicon transistor working as a d.c. amplifier whose gain is inversely proportional to the audio output voltage. Harmonic distortion products due to the non-linear characteristic are balanced out by inserting in series with the transistor a silicon diode of similar characteristics to the emitter-base diode.

The input impedance of the attenuator is approximately 7K ohms. The system's compression threshold begins at 0.8v. r.m.s. Audio input of 10 mV. at point "A" produces, at 10 db. compression, distortion of less than 1%, while at 40 db. distortion is approximately 5%. Lower input levels cause correspondingly less distortion.

Rarely more than 14 db. compression is needed in the shack. This represents a change in gain of five times. The actual amount of compression obtainable from any existing pre-amplifier will depend on the gain available and the proportion of the output voltage fed back.

Any microphone whose output is about —55 db. (0 db. = 1v./dyne/cm²) will suit this system without modification. This includes most 50K ohms impedance dynamics in the lower price class. Apart from their dependability dynamic microphones have an advantage for sideband operation because of their smooth response avoiding the peakiness of crystal, ceramic and controlled magnetic types. Average s.s.b. output will rise since intelligible audio sets the level of flat topping rather than peak responses which degrade intelligence.

This a.g.c. system does not clip in any sense. Power supply and tube dissipation ratings are as for normal speech and should be observed. Clipper type compressors on the other hand increase demand on the power supply and will over-rate dissipation of the final if it is already operating near peak dissipation—which is the case in most commercial class B and AB linears since this allows maximum efficiency and minimum size.

The attenuator is freely adaptable to any amplifier provided input to point "A" is less than 10 mV. r.m.s. and 0.8v. r.m.s. is available to drive the d.c. transistor amplifier. It was first described in Mullard Technical Communications No. 79 for incorporation into transistorised tape recorders. However, a voltage doubler and low leakage titanium oxide capacitor have been substituted to render it compatable with high impedance valve circuits and to provide an attack and decay time suitable for the Amateur Service. With the constants shown, attack time is about 30 msecs. and decay time is about 10 seconds. Doubling the capacity of C1 approximately doubles both times.

Should a.g.c. not be required, as for example when undue noise is present in the shack, a pot. with a pull switch and wired as shown will lend versatility.

The power supply for the attenuator should have low ripple although regulation is not critical. At VK2AMA the existing relay supply is applied through a two-stage capacitor input filter of 4.7K ohms and 100 uF. in each leg. Current drawn by the BC108 varies from zero up to 300 uA. at 40 db. compression.

The whole unit and power supply filter fit neatly on a small phenolic board mounted on the side of the chassis between the microphone socket and grid pin of the pre-amplifier. All earth connections are made to the microphone ground lug.

* 7 Harrow Road, Bexley, N.S.W.

A SIMPLE TWO-TONE TEST GENERATOR*

ROBERT C. CHEEK, W3LOE

THIS little two-tone generator can be duplicated for a parts cost under eight dollars. It has admirably filled a need for a convenient source of one or two adequately-pure audio tones for single and two-tone testing of complete single-sideband transmitting set-ups.[1] We keep it near the operating position at all times. Transistorised and completely self-contained, it can be quickly plugged into the microphone jack to provide a single tone for tuning, a check on unwanted-sideband suppression, and a check on carrier suppression under dynamic conditions. Alternatively, it provides two tones of adjustable relative amplitude for conventional two-tone testing of overall system performance. We continuously monitor transmitter output with an oscilloscope as a matter of operating practice, and a dummy antenna is kept handy. With the 'scope already connected, making such checks is a quick and simple procedure.

The unit uses two R.C.A. 2N406 germanium transistors, each in a Twin-T oscillator circuit. The symmetrical Twin-T circuit differs somewhat from the bridged-T circuit used by Baxter[2] in his general-purpose audio oscillator. Two complementary symmetrical T's, bridging each other, are used in the RC network. The upper T is a low-pass network, the lower a high-pass network, and at the oscillating frequency there is a 180-degree phase shift across the combination.

This circuit has been analysed by Maynard,[3] who states that for optimum feedback conditions, C2 should equal 2C1, and R2 should equal 0.1R1. These proportions are not unduly critical, but limits on R1 for a given type of transistor are imposed by bias considerations. The output frequency depends on the entire combination. The frequency can be varied over a considerable range, however, by changing R2 alone. The output at C2 is a relatively pure sine wave, with no perceptible distortion under oscilloscope observation.

The component values shown in Fig. 1 were chosen to give tones aof approximately 750 cycles and 1800 cycles for the two oscillators with standard values of available capacitors and resistors. The output mixing circuit is arranged so that the 1800-cycle tone appears at roughly constant amplitude, approximately the peak output level of a crystal microphone, at any setting of the output control. The latter controls the amplitude of the 750-cycle tone in the output from zero to nearly twice the higher-frequency amplitude. Thus, with the control at full counter-clockwise position, the unit is a single-tone generator. For two-tone testing, the control is advanced as required to balance the amplitudes of the two generated sidebands. Balance is indicated by sharp cross-over points in the resulting oscilloscope pattern. In either case, the desired absolute level is controlled by the regular gain control of the speech amplifier.

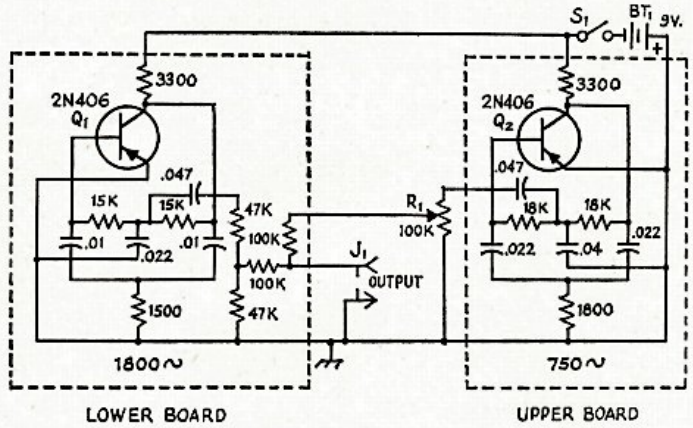


Fig. 1.—Circuit of two-tone oscillator. Capacitances are in uF.; capacitors are 200 volt paper tubular. Resistances are in ohms (K equals 1000), fixed resistors are ½ watt.

BT1—9-volt transistor battery.

J1—Phono jack.

R1—Miniature control, audio taper.

S1—Miniature s.p.s.t. toggle.

The higher tone is used for single-tone testing so that sideband frequencies resulting from harmonics generated by distortion in the audio system will fall outside the pass-band of the usual filter type of exciter. The resulting single-tone pattern thus will deviate from normal only because of inadequate suppression of the carrier or opposite sideband.

CONSTRUCTION

The unit is contained in a 4" x 2¼" x 2¼" minibox. Each oscillator is built on a 3⅛" x 2" piece of phenolic vectorboard. These are mounted as two decks in the box, supported and separated by ½" metal spacers, two at the rear corners and one at the front centre of each board. The boards are mounted far enough to the rear of the box to leave room for the battery, the on-off switch, and the miniature level control. In mounting this control, be sure to place it so that it will not be damaged by the self-tapping screw used to assemble the cover to the box. The battery is held in place by a home-made clip, which is secured to the front panel by the switch mounting. The output phono jack is mounted at the rear of the box, just above the top circuit deck.

The schematic diagram, Fig. 1, shows the circuitry contained on each oscillator deck. Wiring of the decks is a quick and simple procedure. The component leads themselves provide all of the internal interconnections except for one separate lead which picks up the ground points. In most cases, the leads of components which have a common junction are pushed through the same hole, twisted slightly together, soldered, clipped to about ¼" and bent down against the underside of the board. The usual precautions apply to the soldering of junctions involving transistor leads. These should be held close to the underside of the board with a pair of long-nose pliers while the soldering iron is applied and until the joint cools.

Capacitors with 200-volt rating are suggested in the schematic diagram because they are generally less expensive and available in wider variety of ratings than lower voltage units, which could be used. Capacitors of ratings from 100 to 400 volts were used in the actual construction. This was done simply because they were available from the author's parts box at the time the unit was being developed.

Before the boards are mounted in the box, two insulated leads should be soldered to the outer (battery) end of the 3,300-ohm collector resistor of the lower board. One of these should be long enough to reach one side of the on-off switch, the other long enough to reach the corresponding end of the 3,300-ohm resistor of the upper board after mounting. Similarly, an output lead, long enough to reach the phono jack, should be attached to the junction of the two 100K output resistors on the lower board. The ground lug of the phono jack is used to terminate similar extensions of the ground bus from each board. Examination of the circuit diagram will indicate the external leads that must be provided for the level control.

The negative (black) lead of the battery terminal clip goes to one side of the switch. After assembly of the boards to the box, the external connections are completed and the positive (red) lead of the battery clip is soldered to any convenient point on the ground bus of the upper board.

A rough check of the operation of the oscillators can be made with a pair of high-impedance earphones. With the level control fully counter-clockwise, the higher frequency tone should be clearly audible in a quiet room. As the control is advanced, the lower frequency should appear and become preceptibly louder.

(Continued on Page 10)

* Reprinted from "QST," August 1966.

1 Blakeslee, "Testing a Single Sideband Transmitter," "QST," September 1965.

2 Baxter, "A Transistor Audio Oscillator," "QST," February 1965.

3 Maynard, "Twin-T Oscillators for Electronic Musical Instruments," "Electronics World," June 1964.

THE COUPLED TUNED CIRCUIT R.F. PHASE SHIFT NETWORK

R. W. MARTIN, VK2AHI*

IN some Ham-built phasing type s.s.b. exciters using coupled tuned circuits, or so called two coil, r.f. phase shift networks, the construction and adjustment of such a network does not always turn out to be an easy or straight forward project. Quite often a lot of fiddle and much cut and try is resorted to before something near the desired result is obtained.

Perhaps one of the reasons for this could be due to the inadequate and sometimes sketchy details supplied in some constructional articles. However, in certain articles it is my opinion, based on some experimental work and a little theoretical consideration, that the methods of adjustment advocated are technically suspect and misleading.

Therefore, this article has been written in an attempt to shed more light on the actual operation of the circuit, and to apply this knowledge to the construction and adjustment of practical networks.

The circuit, stripped to the bare essentials, is represented by Fig. 1. This depicts the application in an s.s.b. phasing exciter where two low impedance links supply equal r.f. voltages differing in phase by 90 degrees to the balanced modulators.

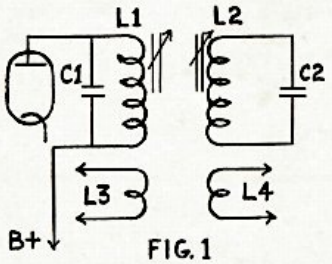


FIG. 1

The following analysis, which uses elementary coupled circuit theory and simple vectors, is confined to the particular application already mentioned and deals only with factors considered necessary to provide a knowledge of its operation.

To simplify the analysis, resistance is ignored, because resistance in circuits of reasonable Q and of the type which would normally be used in such a network, will have an insignificant bearing on the required results. Therefore, for practical purposes Fig. 1 can be redrawn as Fig. 2. It will also be assumed that the coupling between L1 C1 and L2 C2 is loose.

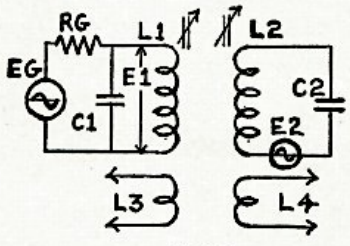


FIG. 2

* 140 North Street, Casino, N.S.W.

Referring to Fig. 2, the generator E_G, R_G, supplies a voltage E1 across the parallel combination of C1 L1, which, if tuned to resonance, will offer a high impedance to the generator. The generator current will be the vector sum of the coil current and the condenser current. In a practical circuit these two latter currents will be approximately the loaded "Q" times the current from the generator, and will therefore be large. The large coil current at resonance will lag 90 degrees behind E1 and the condenser current will lead by the same amount. This is illustrated vectorially in Fig. 3.

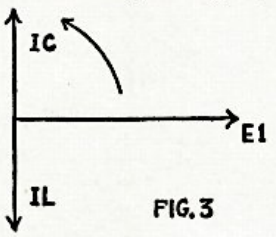
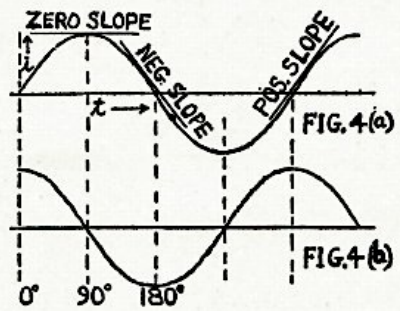


FIG. 3

At this point, for the sake of clarity, it is perhaps as well to review some basic elementary theory. Starting from the fact that if a varying magnetic field created by a varying current in a conductor cuts another conductor, a voltage will be induced in the second conductor. The magnitude of this voltage will be determined by the rate of change of current in the first conductor, being large for large rates of change and small for small rates of change.

The above condition applies to the current in the coil L1 which, being a sine wave current, as illustrated in Fig. 4(a), creates a flux which cuts the turns of L3 and induces in it a voltage, proportional at each instant to the rate of change of current in L1. By inspecting Fig. 4(a) it can be seen that the rate of change of current corresponds to the slope of the curve and is changing all the time from instant to instant. A tangent drawn to meet the curve at any point gives the slope of the curve at that particular point.



If it were possible to accurately draw a sufficient number of these, and their individual slopes were to be plotted on a graph, considering slopes upwards from left to right as positive slopes and slopes downwards from left to right as negative slopes, it would be found that the curve of Fig. 4(a) had: (i) the greatest slope where it crossed the zero axis, and (ii) zero slope where it reached its peak upwards or downwards. The result of plotting such a curve is shown as Fig. 4(b).

Now since Fig. 4(a) represents the instantaneous value of current in L1 plotted with respect to time, the new curve, Fig. 4(b), represents the rate of change of this current with respect to time. Consequently, as was previously mentioned, this determines the voltage induced in L3, which will therefore be proportional at each instant to the new curve. From an inspection of Fig. 4(b) it can be seen that this new curve has the same shape as the original but is displaced from it by a quarter cycle or 90 degrees, and therefore the voltage induced in L3 will be displaced 90 degrees from the current in L1.

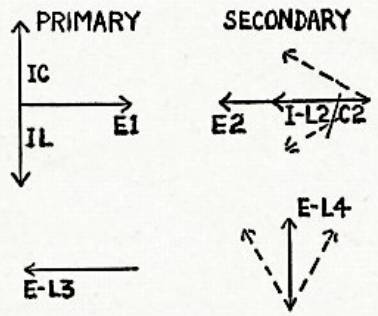
Incidentally, and as a matter of interest only, the results above are derived mathematically by differentiating the function represented by the curve of Fig. 4(a), the result being known as the first derivative or in this case, di/dt. Thus di/dt represents the rate of change of current with respect to time and when multiplied by the mutual inductance possessed by L1 and L3 will determine the actual instantaneous voltage induced at any instant in L3 provided the correct units are used.

Returning to L1, the current flowing in this coil will also induce a voltage in the secondary coil L2, in exactly the same manner as just described for the link L3, and bearing the same phase relationship to the current in L1 as the voltage of link L3 does, i.e. both will be displaced 90 degrees from the current in L1. This voltage can be considered to act in series with L2 and C2 and is denoted as E2 in Fig. 2.

If L2 C2 is resonant at the frequency of the induced voltage a current will flow which will be in phase with the voltage. This current flowing through L2 will induce in the mutually coupled link L4 a voltage which at each instant is proportional to the rate of change of current in L2. This voltage, in the same way as explained for the induced voltage in L3, will be displaced 90 degrees from the current in L2.

Adding all these results to Fig. 3, we obtain Fig. 5, which clearly shows that the desired 90 degrees phase

FIG. 5



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Outp. Imped. ohms	40	15	15	15	3	8	600
Supply Volt. —volts ..	9	9	9	9	12	9	9
Typical Distortion % ..	2	3	3	3	3	3	1
Frequency response	300-15K	200-12K	200-12K	200-12K	50-12K	50-12K	20-20 K
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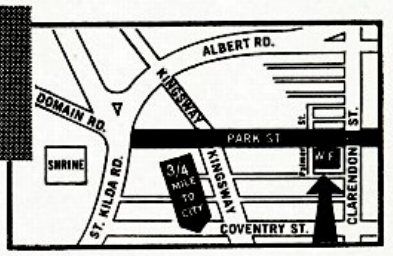

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relationship between link output voltages has been achieved. The dotted vectors for I (L2 C2) indicate the variation in phase of the secondary current for small amounts of detuning above and below resonance, the resulting link voltage, E-L4, phase shifts are also shown dotted.

The all important conclusion to be drawn from the foregoing analysis is that the secondary tuning is the controlling factor in phase adjustment. This follows from the fact that the current L1 is the vector from which every secondary affect is referenced. For the same reason the primary tuning should have no material effect on the phase relationship existing between the link output voltages. What the primary tuning should do, if the generator impedance is taken into account, is to vary both link voltages up or down, as it is tuned to, or detuned from, resonance respectively. Again stressing that the coupling to the tuned secondary is loose.

A point of practical interest, which emerges from the above, is that the primary tuning will effect the phase relationship between the link output voltages if it has any effect at all on the generator frequency.

TUNED CIRCUIT COUPLING

Factors which influence the degree of tuned circuit coupling are now discussed. A basic property of the network is that with loose tuned circuit coupling the link output voltages differ in phase by 90 degrees when the secondary is tuned to resonance. However, if the coupling is very loose, insufficient energy will be transferred from the primary to the secondary. Alternatively, if the coupling is tight, say critical or greater, two effects concern us. Firstly, as the tuned circuit coupling is increased the effect on the mutual coupling between each link and the tuned coil not intentionally associated with it, ceases to be insignificant. Secondly, in order to determine the desired secondary resonant point, amplitude response indications are used, but with circuits whose coefficient of coupling is greater than critical, the primary has two pronounced peaks, and for coils of equal "Q", so has the secondary. Under these conditions amplitude response measurements are useless as indications of resonance.

Therefore, to strike a balance between the too loose and too tight conditions, and to provide a margin for variation, a suggested suitable range of degrees of coupling, expressed as a percentage of critical, could be those couplings lying between 80% and 50% of critical. An arbitrary figure to try initially would be the mid-range figure of 65%. This should be quite satisfactory because even at 50% of critical the loss of secondary amplitude amounts to only 2 db, i.e. the secondary amplitude is 80% of the maximum attainable with critical coupling.

The construction of the network can take any form which allows the coupling between the tuned primary and tuned secondary to be varied, but with provision for locking the coils in the correct positions once this is determined. A suggested method is for the two coils to be wound on slug tuned formers, and mounted vertically side by side on a metal plate or chassis by means of a screw or stud in each former. A long slot instead of a hole is provided for mounting one of the coils so that the spacing between it and the other coil can be varied and then locked in position, see Fig. 6.

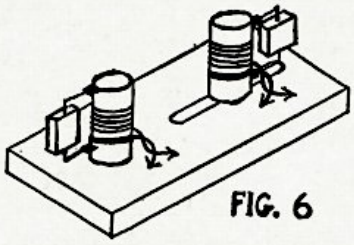


FIG. 6

An inspection of a universal resonance curve will indicate that there is quite a large shift in phase around the resonant point of the secondary for small amounts of detuning. Typically for "Q's" of 100, this amounts to approximately 11 degrees for 0.1% detuning, with an approximate amplitude variation of only 2%, for the same amount of detuning. In other words, tuning around the resonant point allows relatively large phase shift adjustments with small amplitude effects, which is desirable.

The above also indicates that, for stable sideband suppression, the tuning should not wander to any extent, consequently, rigid construction and stable components should be used. The coils are, of course, susceptible to pick-up from stray fields, and the usual precautions should be observed in this regard.

Apart from the points just mentioned, and that it is desirable that the tuned circuits have reasonably high "Q", nothing else is very critical. For 9 Mc., ½" diameter, or thereabouts, slug tuned formers with sufficient turns to resonate with 100 pF. condensers will prove satisfactory. Some circuits using this system of r.f. phase shift show h.t.+ connected to the bottom of both coils. This is not necessary, instead, the second coil can be earthed at one end and the link wound at that end.

Any secondary link movement will affect tuning, and hence, phase. It is therefore desirable that it be a fixed link of one or two turns, fairly tightly coupled to the earthed end of the secondary. I merely selected two turns for my links on speculation, which worked fine with the amount of output available from my driving stage. I also know that one was built using one turn which had ample output. Regardless of the choice, it is recommended that the secondary link should be in a fixed or semi-fixed position, as described above, during the adjustment procedure.

The primary link should be similar to the secondary link but not as closely coupled, and should be arranged so that the coupling between it and the primary coil can be readily varied.

CIRCUIT ADJUSTMENT

Once the network has been constructed, and with all the foregoing in mind, it is quite possible to juggle intelligently with the several variables and, eventually, to achieve the desired results.

However, it would be nice if the coupling and other adjustments could be carried out without the ambiguity which accompanies the cut and try method, particularly where many factors interlock. Happily, this is quite easily done with the help of a v.t.v.m. with an r.f. probe. But if this is not available, a reasonable job may be done with a simple diode arrangement such as that shown in Fig. 8, which is used with a v.t.v.m. or even a 20,000 ohms per volt voltmeter. This will be satisfactory provided enough r.f. is available so that the small signal non-linearity of the diode is minimised. This factor is only significant for the coupling adjustment because voltage ratios are involved.

One other small requirement temporarily necessary in order to set the coupling is that the first tuned circuit in the anode of the network driver tube must be capable of being tuned through resonance without any significant reaction on the oscillator operation. If the network is normally driven by a buffer tube, then this requirement has been met. However, if, as is the more common case, the crystal oscillator drives the network directly, it will pay to unplug the crystal and drive the grid of the tube with a makeshift Pierce or other convenient form of crystal oscillator. If a v.f.o. or signal generator is available with sufficient output at the frequency required, it could be used.

If all this is too inconvenient, then the coupling must be adjusted by trial and error with all its attendant uncertainty.

However, let us assume that the coupling is to be set to a definite percentage of critical, as recommended, and that some signal source at the correct frequency is available to drive the tube feeding the network, we then proceed as follows.

With the links connected to the balanced modulators and the coils set to maximum distance apart, set the balanced modulator to the balanced condition, i.e. carrier balanced out. Connect the r.f. probe across the secondary link output and alternately tune both primary and secondary until maximum output is observed on the meter. The probe is then transferred to the primary link and the actual deflection noted and tabulated as E1. The secondary is then detuned completely, or what is much easier, short circuited, i.e. a short circuit is placed across either L2 or C2. The deflection of the meter will increase as a consequence of this and this new reading is noted and tabulated as E2. The percentage of critical coupling can now be determined from the graph Fig. 7, where percentage of critical coupling is plotted against the voltage ratio E2 ÷ E1.

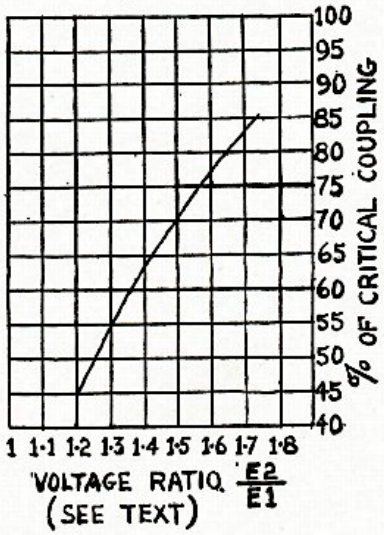
If the coupling, as revealed by the method described above, is too loose, the adjustable coil is moved progressively closer to the fixed coil, and with each movement, the above procedure is repeated in its entirety until the voltage ratio E2 ÷ E1 obtained indicates that the correct degree of coupling has been achieved. The coil is then locked in this position.

The makeshift oscillator or signal source, if used, can now be removed and normal crystal oscillator operation resumed. In which case the primary is tuned just off resonance, so that the crystal oscillator starts reliably, and the secondary is tuned to maximum secondary loop output.

If a buffer tube normally feeds the network, of course the above will not apply, and in this case both primary and secondary are tuned to resonance by alternately adjusting both primary and secondary until maximum **secondary** loop output voltage is obtained.

For either type of primary operation the next adjustment is to see that the secondary is peaked and to measure the output from the secondary link. If this is within the range of values required for the correct operation of the particular balanced modulator used, all that remains is to connect the meter probe across the primary link and adjust the coupling of this link until the same output voltage is obtained as was just noted across the secondary link.

FIG. 7



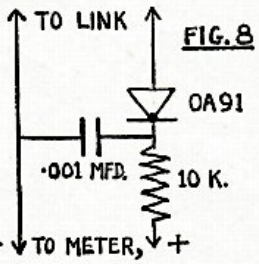
Depending on how much the primary link has to be moved, there will be some reaction on the secondary link voltage and perhaps on primary tuning. However, repeating the procedure just described one or more times in the order given will bring all conditions to the point where the primary is tuned to suit the requirements of the amplifier or crystal oscillator, the secondary is tuned to resonance for 90 degree phase shift and the loop outputs are equal.

The particular order of adjustment and measurement is important and can be summarised as follows:—

(1) Primary tuned to suit the operation of network driver stage.
(2) Secondary tuned to maximum secondary link output voltage.
(3) Secondary link voltage noted.
(4) Primary link coupling adjusted so that the output voltage equals the secondary link output voltage.

Final phase and amplitude adjusted is carried out for sideband suppression on the complete exciter in the approved manner, which, if no extraneous phase shifts have to be compensated for, should only require a touch on the secondary tuning for phase, followed by a touch, if necessary, on the primary link coupling for amplitude. When completely satisfied, the links can be cemented in position.

All of the above takes very much longer to tell than to perform and with a little familiarity it is very quickly accomplished.



PREFERABLY D.C. V.T.V.M. BUT 20,000 OHM/VOLT MULTIMETER CAN BE USED—USE ONE RANGE.

Referring back a little to the point where the secondary link output voltage was measured for the first time. If this happened to be higher or lower than required, then the best method of overcoming this is to adjust the input to the network by varying the driver stage operating conditions or design.

Alternatively the secondary link coupling may be moved. However, if this is already of two turns and closely coupled and the output is too low, the input to the network should be raised. On the other hand, if the output is too high, then the secondary link may be adjusted, either by reducing the turns on the link from two to one or physically decoupling it from the secondary, or both. If a reduction from two to one turn is made, then the primary link should also be reduced to one turn. If decoupling the secondary loop is resorted to, and depending on the physical arrangement of the two tuned coils, there could be some limit to the amount which the link should be separated from its tuned circuit. The reason for this is that it is desirable, as far as possible, for each link to sample only the flux from the particular coil to which it is assigned. In cases where large secondary loop changes are made it would be as well to quickly recheck all adjustments from the beginning.

A test unit was constructed and, using a signal generator driving a pentode amplifier as a source, together with a wide band oscilloscope, having equal X and Y channel phase shifts, as a detector the familiar 90 degree circular phase shift pattern was quickly obtained. Tuning the primary then merely increased or decreased the size of the circle, indicating the correctness of the conclusions derived from the analysis regarding the effect of the primary tuning on the circuit's operation.

In conclusion, I feel that the network can be made to work, and work well, with very little effort. Periodic re-adjustment, if the network is well constructed using stable components, should be nil or very little and reduced to two, one for predominantly phase and the other for amplitude. It has several advantages over some of the circuits used for the same purpose. It is very easily built and can be constructed of materials usually found around the shack, it does not require tight tolerance components, is materially unaffected by stray capacitances, is capable of a wide range of phase shift adjustment, has ample output at low impedance, and, with a little familiarity, is quickly and easily adjusted.

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TWO-TONE GENERATOR

(Continued from Page 6)

It must be assumed that the builder has an oscilloscope, since the unit will not serve its intended purpose without it. Final checks on the waveform of the two tones should be made by observing each tone separately on the scope. The higher frequency tone can be temporarily eliminated from the output by grounding the junction of the two 47K output resistors on the circuitry of the lower board.

☆

W.A.M.R.A.C.
World Association of Methodist Radio Amateurs and Clubs

By Courtesy of VK3LC

W.A.M.R.A.C. was born in 1957 out of G3LQK—the Huddersfield South Circuit Methodist Radio Club, the first Church Amateur Radio Club in the world—to help Radio Amateurs and S.w.l's to increase the enjoyment of their hobby by introducing them to each other, and strengthen their fine Christian service of spreading friendship around the world.

W.A.M.R.A.C. stands for the advancement of international understanding, goodwill, and peace through the world fellowship of Radio Amateurs united in the ideal of service.

The purpose of W.A.M.R.A.C. is, firstly, to find all the Methodist and other Church Radio Amateurs and S.w.l's in the world, and to introduce them to each other through the publication of the "World Methodist Register of Church Amateurs, Clubs and S.w.l's", and the circular letter issued free to all members; secondly, to encourage and to give guidance for the establishment of Circuit or Church Amateur Radio Clubs at home and abroad offering education in the use of Amateur Radio; and thirdly, to encourage fellow Christians to take up this wonderful hobby of Amateur Radio and S.w.l'ing.

There is a place in W.A.M.R.A.C. for everybody. Methodist as well as all other Radio Amateurs and S.w.l's are invited to become members. So far there are 750 members from 33 countries enrolled, and a register is being compiled listing these members so that a means of introducing each to his fellow is being devised. This register is a very useful tool to facilitate contact with fellow Radio Amateurs and S.w.l's throughout the world.

Because W.A.M.R.A.C. stands for Christian Radio Fellowship, whether it be local, further afield within one's own country, or abroad, Amateur members are asked to cultivate this fellowship from their stations in all their contacts, and especially with W.A.M.R.A.C. headquarters. The headquarters station, G3NJB, operated by Arthur G3NGF, can be heard most afternoons working VK members on 14145 Kc. after 0600z. Any Amateurs hearing these contacts are invited to break in and enjoy a chat with Arthur.

The VK net is operated in the 3.5 Mc. band every Thursday evening and any Amateur is invited to join that net also. In addition, there are Tapespond and Folder Clubs devised especially to help the S.w.l. members to keep in touch with each other. The Christians are one people in all the world. Here by Amateur Radio is a way of enjoying our oneness with one another.

Further particulars may be obtained by writing to the Hon. Secretary, G3NJB, Arthur Sheppard, 1 North St., Crewe, Cheshire, England.

TRANSISTOR SIDEBAND—INCREASE YOUR TALK POWER

COL HARVEY, VK1AU*

One of the nicest things about Amateur Radio is the way in which every new project seems to generate additional avenues for experiment.

The transistor audio stages used in the VK1AU Sideband project ("A.R.," Feb. 1967) are no exception. Meditating about the need or otherwise for automatic load control, an inspiration prompted by an article in the Transistor Handbook (Stoner and Earnshaw) suggested that a form of audio limiting would be easy to add to the audio stages of the exciter. An evening's work soon proved the point. The block diagrams (Fig. 1A and Fig. 1B) for "before" and "after" show the basis of the inspiration.

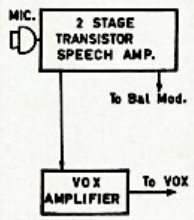

FIG. 1.A.

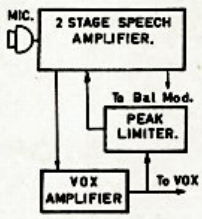

FIG. 1.B.

The peak limiter merely takes some of the audio which drives the VOX unit, rectifies and filters it, and uses it to control the base of any general purpose transistor. The transistor is then shunted across the collector of the first speech amplifier. When the base bias potentiometer is set so that the limiter transistor is operating on the knee of its curve, any further negative bias from the diode lowers the collector impedance sharply and so provides an effective shunting or limiting action on the controlled stage. The circuit is simple, but it works.

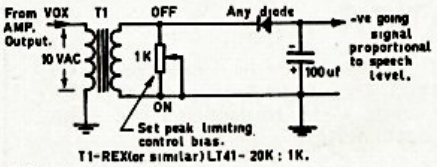

FIG. 2A.

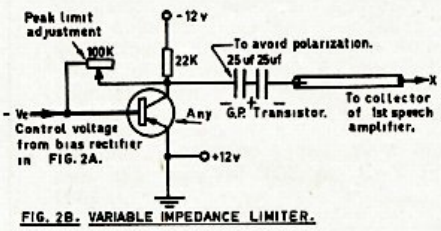

FIG. 2B. VARIABLE IMPEDANCE LIMITER.

Initial adjustment is simple: Set R1 so as to short input to the diode. Set R2 to maximum resistance. Apply a steady tone at normal speech level to the transmitter and adjust R2 until speech level just starts to drop (as observed across the VOX transformer or on a c.r.o., field strength meter, final plate current meter, etc.). Leave R2 set to cause about 5% drop in normal output. Now open R1 until the base voltage on the limiter increases by about 0.1 volt on speech peaks. Increase the gain of the speech amplifier about 10%, to improve the talk-power.

Speech quality will deepen as gain is increased, and it may be desirable to re-adjust the amount of "top-cut" to a different level to that used without "compression" or peak limiting. It will also be found that the audio drive level to the VOX unit is reduced by the shunting effect of the additional transformer. However, there is still ample gain for even distant-speaking VOX operation.

No particular layout or shielding is required. The prototype worked well with no sign of r.f. feedback or hum, even when spread out all over the bench. However, it would be as well as to build the entire gadget on a strip of matrix board which can later be slipped into an i.f. transformer can. If miniature potentiometers are used, these can be adjusted initially and then left set, so there is no need for a front panel control, other than perhaps a compressor-disconnect switch.

About the only thing that can go wrong during construction is for the diode to be reversed. Check this by ensuring that the 10 volts or so of a.c. across the primary of the coupling transformer produces a negative going voltage at the base of the transistor. Under normal operation, the transistor base will swing up from about 0.2 volt negative to about 0.4 volt negative.

The c.r.o. pattern will show no "clipping" or "flat-topping" and there will be about 20% of the pattern displaying speech peaks superimposed on a solid low and medium level pattern. Although excessive gain cannot now cause flat-topping of the r.f. amplifiers, excessive audio levels can generate distortion products which seem to show up as an enhancement of the normally suppressed sideband. However, even without a c.r.o., proper adjustment of speech level is easily achieved with on-the-air reports, and once determined, subsequently allows a very wide change in speech levels to be accommodated without causing splatter.

☆

HINTS AND KINKS

IN-BUILT BATTERIES

Tonight I replaced the batteries in my transistorised band-edge marker. No experienced Ham will be surprised to hear this simple job took well over an hour!

The two pen-light cells have to be soldered into the circuit—common plan with home made gear. Go ahead, solder 'em in, and what do you find? No volts. Take 'em out, and try them on a meter; 1½ volts per cell. Put 'em back. No volts.

If you've plenty solder you can keep doing this for a long time. Only when I ripped the cell apart to see what was intermittent did the solution appear. The solder was not going onto the case at all, only onto a metal disc (size of a threepence) held by the cardboard covering tube.

In a pressure type holder, this disc would probably be held against the zinc case tight enough to ensure contact, but soldering a wire on just pulled it away from the zinc.

May every reader be spared this time-wasting gremlin.—Lee VK2AXK.

* 16 Leane Street, Hughes, A.C.T.

SWAN 500

FIVE BAND – 400 WATT SSB TRANSCEIVER
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SIDEBAND

Sub-Editor: PHIL WILLIAMS, VK5NN, 37 Winns Rd., Coromandel Valley, 5051

Radio activity in the VK5NN shack has been at an all-time low for the past few months except for the addition of a 2.1 Kc. mechanical filter in the Delta-het receiver in order to improve the selectivity for the R.D. Contest. A try-out on 80 metres in the N.Z.A.R.T. Memorial Contest showed its superiority over the four-crystal filter using FT241 surplus crystals, some of which are not according to label. Since they are now over 20 years old, this is not surprising, and they will need re-checking for frequency and re-activating, to see some more activity in the old AR7 for 2 metre s.s.b. work.

S.S.B. ON V.H.F.

The amount of 2 metre (and 6 metre) s.s.b. on the air is very pleasing and I am sure this will open up some new DX possibilities, especially when the new regulation linear amplifiers get going.

The 3-400Z grounded grid tubes with about 1800 volts on the plate, will give the 400 watts p.e.p. output, which, we understand, will be permitted, and several 6 metre linears have been described, with photographs, in the American periodicals.

For 2 metres there is but one economical choice, viz. the pair of 4X150s in push-pull with linear tank circuits—there are the later 4CX250Bs, etc., available new for more money, of course—and these will do very well with about 1500 plate volts, 250 volts on the screen and approximately 40 to 50 volts of bias, depending on the particular tubes in use.

Many of the surplus tubes of this type are a little low in emission, which is why they are surplus to requirements, and cheap, but a few hundred extra plate volts to a pair, will restore the output capability to 400 watts. It is well to remember that these tubes are quite efficient, and although the input on peaks may be about 600 watts, i.e. about the same as a 150 watt a.m. transmitter, the meters on typical male speech will kick to about half of this, and the transformer in the power supply may be smaller than this as far as thermal ratings are concerned.

If you are planning the amplifier and power supply, it is very useful to provide a "half" voltage from the power transformer so that loading and testing can be carried out at half voltage and half current, and then will be about optimum for the full voltage supply. The half voltage will then be available for c.w. operation, too.

It is desirable to keep the plate "test" voltage well in excess of the screen voltage—a point to be remembered with some of the European penthodes and tetrodes—otherwise screen grid dissipation will be exceeded.

In my opinion, the half voltage supply is quite necessary for v.h.f. linears, for which c.r.o. display of the r.f. envelope is not always possible unless you have a 'scope which will handle 144 or 432 Mc. with the deflection plates tuned as lechers.

The lower voltage supply is handy, too, for those rather protracted adjustments to get the darned things correctly neutralised. Adequate shielding with 400 watts of 2 metre soup in the shack is essential, or every little grid in the shack will get more than it bargained for, particularly those coming out to top-cap connections.

GROUNDING THOSE GRIDS

With the use of higher powered linear amplifiers for 10, 6 and 2 metres, the term "grounded-grid" is now out of fashion and "cathode-driven" is the term now preferred to describe this well known mode.

In an article on page 36 of June 1967 "QST," two well known authorities (Orr W6SAI and Sayer WA6BAN) discuss ways of using cathode drive at higher frequencies, when the grid is at neither a.c. (r.f.) nor d.c. earth potential. Some experimental curves for the 3-400Z with and without grid tuning, i.e. connecting one grid lead to chassis and tuning the other one, are given, and future articles on "Super-cathode-driven" and "semi-cathode-driven" circuits are promised—for those who wish to use tetrodes. I await these with eagerness.

FOUR-TUBE LINEAR AMPLIFIERS

These amplifiers have become very popular in s.s.b. circles. Where the drive available from the exciter is limited to 20 to 50 watts the increase in power output is worthwhile, but to put one of these on the end of a Swan 500 or 350, or a Galaxy V. is rather a waste, as there is not a great deal of difference in received signal for a 3 db. increase at the transmitter.

Tubes such as the 6DQ5 take quite a bit of drive because of the bias required and the high input capacitance. I have measured 31 pF. input capacitance for a tube in a socket mounted on a chassis, and allowing for say 125 pF. on 10 metres, provide a problem.

In the January 1967 issue of "73" Magazine, W7CSD describes a linear using four new Amperex tubes type 6KG6. As with many articles in American magazines, this one shows a rather "experimental" approach, without doing very much preliminary figuring and measuring.

You will see what I mean when I relate that he assembled the tubes in the "cathode-driven" connection, then ran them with 2000 volts at 100 mA. standing current — plates cherry-red. The rated anode dissipation of these 6KG6s is 34 watts each, which is about the highest of the line-timebase tetrodes —the 6HF5s are 28 watts.

I have no maker's data on the 6KG6, but it is a high transconductance type and I should think the heater current would be 10 or 12 amps. for four tubes in parallel. W7CSD's last sentence states that the 6KG6s have a promising future—to which I would add, but not with 2000 volts on the anodes, even in s.s.b. service. I would suggest that 1200 to 1400 volts should be the limit, at 100 mA. of standing current.

The question of heater-current for these four-in-a-square amplifiers should be watched. An example brought to me to check because its output was less than the exciter, was noticed to be a little "dim" inside the bulbs. The 6.3 volts, 5 amp., winding on the transformer was, of course, overloaded and the separate chassis power supply needed long leads and several plugs and sockets. Less than 5 volts remained at the heaters.

A temporary solution was affected by adding 2.5 volts from half of an unused rectifier winding. This also sat down on the job, being on the outside of the transformer, but the resulting 6.5 volts with mains supply to a 260 volt primary tap, gave the amplifier a new zest for life.

73 for now, Phil VK5NN.

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON—
SO SHOULD A LOT MORE
AMATEURS!

TECHNICAL CORRESPONDENCE:

TRANSISTOR R.F. POWER AMPLIFIERS

Editor "A.R.," Dear Sir,

I have been following with much interest the series of articles on "Transistor Amplifier Design," by VK3ZRY in recent issues of "Amateur Radio." The articles have been competent and readable, and are a credit to Australian Amateur technology. I should like, however, to make a few comments on the most recent one (August issue), treating r.f. power amplifiers. Perhaps they may be useful to expand the subject somewhat. I shall refer to several articles published in the "Equipment Exchange Bulletin," but to show that I am (trying to be) modest, I'll designate them by numbers in brackets.

Class A operation is defined as the bias system which allows anode or collector current to flow for the whole 360° of the input cycle. Class B is defined for anode or collector current to flow for 180° or half of the input wave, for each valve or transistor. Class C allows anode or collector current to flow for less than 180°, ordinarily 120° to 150°. Class K is a special case, involving the shift of bias with signal, a subject I shall explore in detail one day.

Now, in a transistor, no collector current will flow until the signal at the base exceeds the voltage threshold of the base-emitter junction. This means that no (or very little) current will flow in the output until the input wave exceeds about 0.25v. for germanium or 0.5v. for silicon. Thus, for true Class B operation, a transistor must actually have a slight forward bias, to allow it to conduct for the whole half cycle of the input. If operation is "zero bias," the condition will not be Class B, but Class C. Since the reverse voltage limit of the base-emitter junction is limited by its very inflexible zener characteristic, and is of the order of 4-6v., and since no output current flows until the input rises to at least 0.5v. (for silicon), you can see that a 0.5v. threshold can represent a considerable fraction of a signal having a peak amplitude of, say 3v. Depending on the ratio of driving voltage to threshold, this can result in a collector current angle of 130-150° for an input signal of nominal amplitude. This means that with zero bias, you will have quite satisfactory Class C operation of a transistor r.f. power amplifier!

In order to obtain a smaller angle of collector current flow, it is necessary to apply some source of additional reverse bias between the base and emitter. The simplest way to do this is to insert a resistor in the emitter lead; if it is bypassed, the input impedance of the stage will remain the same, but the added bias (developed across the bypassing condenser) will reduce the angle of current flow. If, however, the emitter resistor is not bypassed, it will have the effect only of increasing the input impedance of the base circuit of a common-emitter amplifier. Increased input impedance will necessitate raising the tap or increasing the number of turns of coupling link in the base circuit. Therefore VK3ZRY's emitter resistor in his Fig. 6A should be bypassed.

Another method of applying reverse base bias (other than applying a fixed potential from a bleeder) is to insert a "base leak" (analogous to grid leak) consisting of a paralleled resistor and condenser in the base-return circuit, as VK3ZRY shows in his Fig. 6B. This has the advantage of not robbing voltage from the collector supply, but if enough of the latter is available, the bypassed emitter resistor is preferable, because of the added d.c. stabilisation it affords.

After all this, however, one may well ask whether added reverse base bias is desirable for Class C operation of transistor amplifiers. The effect of the added bias is to decrease the angle of collector current flow. Theoretically this increases the collector circuit efficiency, but there are several dangers and difficulties involved. For one, more drive voltage is required, but an analogy with valve operation is dangerous. With a valve, you can drive the grid as negative as you please, and it matters only that the conduction occurs as the signal swings above cut-off bias. With transistors, there is a definite limit to the negative voltage you can apply to an (for example) NPN input. It is the abovementioned zener reverse charasteristic of the base-emitter junction.

Thus, if your signal input is 3v. peak, for a max. BV_{EBO} of 4v., and if no bias is provided, conduction will occur when the input signal is between +0.5v. and +3v. (for NPN), and no conduction will take place when the input is between +0.5v. and —3v. Now, if you add another —1v. reverse bias, conduction will occur between +1.5v. and +3v., and non-conduction between +1.5v. and —3v. If you increase the drive to make up for this loss in average driving power, you stand the real danger of exceeding the BV_{EBO}. Thus we must interpret cautiously the statement that bias and drive "are best juggled in practice to achieve best efficiency and output". This is possible only when there is a margin of safety available between $-V_{EB}$ and BV_{EBO}. It also depends on the regulation of the driving stage, from which—let us not forget—appreciable power is being obtained. All of this is not mere theory, because one of our authors has destroyed several silicon transistors by base-emitter junction death, in an effort to apply more drive with added reverse base-bias. His devotion to the Cause of Progress has been duly noted!

Furthermore, when the angle of collector current flow is reduced, efficiency will be increased only if the Q of the output resonant tank circuit is sufficiently high to provide enough "flywheel" effect to keep a good amplitude of a.c. voltage when the pulse is shorter. That word "pulse" is important indeed, because that is the meaning of a reduced angle of collector current flow: a smaller portion of the collector current cycle is available to excite the output tank. But what happens when you apply a very rapidly changing current to an inductance? $dE = L(di/dt)$, and the peak voltage increases. This is implicit in the definition of Q, where Q is proportional to L, for a given amount of loss resistance. Now this is no problem as long as the output tank is loaded sufficiently. But with a shorter angle of current flow and a higher tank Q, the system becomes more sensitive to variations of load. This is obviously important in Amateur systems, where the load is not always perfectly at resonance. If the load becomes inductive (e.g. when operating above the resonant frequency of an antenna), or is reduced, there is every good chance for the voltage at the collector to rise to a ruinous level. This has also been discovered the hard way at the workbench! Remember that there is no such thing as an "I.C.A.S." voltage rating for an exactly-rated transistor.[2, 3]

If, on the other hand, Q is not sufficient in the output tank, a reduced angle of collector current will result in lower, not higher efficiency. The one advantage of increasing base reverse bias, is the possibility of making full use of what Q is available in the output tuning circuit at hand, but as you can see this has to be done with the proper load, and cautiously. In general, the Q of common-emitter transistor output circuits tends to be low, owing to the relatively high collector currents and inadequate size of wire in the inductance.

A CONCLUSION

It is safest to operate an r.f. power amplifier with zero additional bias, or at least to leave emitter resistors unbypassed, **unless** you are confident that you can stay within the base and collector voltage ratings under all possible conditions of operation. The feedback system described in the SC-12 edition of the "R.C.A. Transistor Manual," p. 436, will go far towards protecting the system from over-voltages, but only if the initial operating conditions are satisfactory. Negative feedback can only maintain control when performance limits of all systems within the feedback loop are not exceeded.

One further point should be mentioned. In choosing a transistor for an amplifier, or in choosing the supply voltage for a given transistor, one often sees the statement that the supply voltage should be less than or equal to $\frac{1}{2}BV_{CES}$ or $\frac{1}{2}BV_{CSO}$ if unmodulated, or half that amount if collector modulated. Now this assumes that the unmodulated collector voltage will rise to twice the supply voltage on peaks, but this is only true if there are no transient overvoltages present; i.e. if the load is sufficient, if the load is not inductive, if the power supply is well bypassed, and if there are no parasitics. All of this is possible, but it can be a lot to ask from a practical amplifier—and again this has been discovered by the Method of Despair. It is somewhat more practical to provide a margin of safety for collector voltage rating,[2] not omitting to note that the actual collector voltage rating can decrease appreciably as the collector current increases.[2, 5]

(Continued on Page 16)

WHAT IS THE I.A.R.U.?

THE I.T.U. and its efforts to establish spectrum management covering radio communication have been outlined in a previous article, and the Amateur Service's justification for making spectrum claims has been ably defined in last month's communication.

How then, **can** the Amateurs of a country convince their administration to support the allocation of adequate frequency bands at international radio conferences? To try to answer this question, let us look at one organisation designed to assist in this operation—the I.A.R.U. or **The International Amateur Radio Union.**

HISTORY

The I.A.R.U. had its 41st anniversary last year, having a total membership of over 70 countries.

Early in 1924 nine nations (France, Great Britain, Belgium, Switzerland, Italy, Spain, Luxemberg, Canada and the United States) met in Paris to discuss the formation of an international association of Amateurs. With considerable enthusiasm, a Congress was organised and held in 1925 with a total of 25 countries attending.

Initially, individual memberships were considered, but by 1928 the constitution only provided for national societies, of which the W.I.A. was one.

OBJECTIVES—HEADQUARTERS

With much foresight the objectives of the Union formulated forty years ago differ little from the present day requirements—"the affecting of co-operative agreements between the National Amateur Radio Societies of the various countries of the world on matters of common welfare; the advancement of the radio art; and the representation of two-way Amateur Radio communication interests in international communication conferences."

In practice, the I.A.R.U. has done just this and since 1927 has been one of the international organisations authorised to appoint observers to I.T.U. conferences, although it does not qualify for a vote.

Because of the A.R.R.L's predominance in size and scope of activities, it was designated the headquarters of the I.A.R.U., but in every other respect, the A.R.R.L. is simply a member organisation. No remuneration is received for the performance of its administrative function on behalf of the I.A.R.U., and no funds or dues are required of the other member societies.

REGIONAL ORGANISATIONS AND SIGNIFICANCE

The published map shows the world divided into three regions. This came about in 1947 when the aim of the I.T.U. was to permit differences in frequency usage between Europe and the Americas for frequencies below 4 Mc. However, it should be noted that the I.T.U. approach to frequency allocations has been to have **world-wide uniformity** but difficulties in achieving this led to the formation of the three regions.

Region 1 is Africa and Europe, including Russian territory right across Northern Asia. Region 2 is the Americas and includes part of the North Pacific Ocean to take in the Hawaiian Islands.

For better or worse, what is left is Region 3 or our part of the world, i.e. the southern part of Asia and the South Pacific. Naturally enough then, this regional set up adopted by the I.T.U. is the framework within which the I.A.R.U. conducts its affairs.

Let us look briefly at the significance of the regions. An appreciation of the geographical and sociological factors leads to a better understanding of the problems facing the Amateur Service.

In Regions 1 and 2 the main areas lie north and south of the equator with a range of climatic variations and varying degrees of technical development between the extremities. Countries usually referred to as developing countries are mostly in the tropics with the more highly developed areas to the north and south of them. There is a fair degree of **community interest** in these regions, i.e. countries are in the same continents, time differences are moderate and radio propagation between countries is favoured.

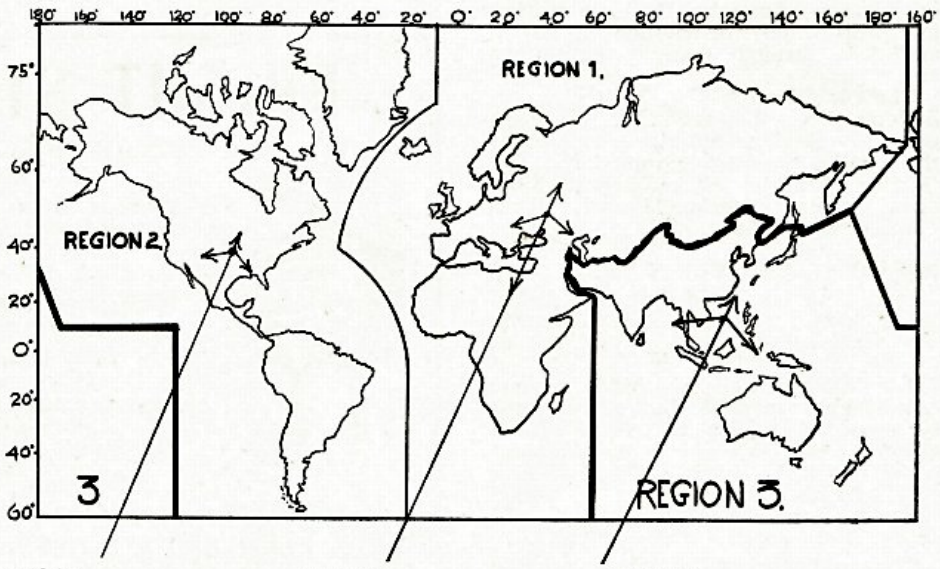
Region 3, South East Asia and Australasia, lacks the same kind of community interest as most of the countries are in the tropical belt and in common with countries in other regions at similar latitudes, most have become independent in the last 20 years, and in most respects are properly regarded as developing countries.

Region 3 is the largest in area although most of it is ocean and extends around 180 degrees of longitude, time differences are great and radio propagation is handicapped—it does not form a cross section of the world as others do.

A look at the map will show the population of Region 3 as nearly 2,000 million with Regions 1 and 2 combined making only 1,380 millions. Yet Region 3 only has one-seventh of the land area!

It is readily understood then, why there is a low level of living for most

I.T.U.-I.A.R.U. WORLD, REGIONAL DIVISIONS



REGION 2:

Population: 480 million.
Amateurs: 300,000.
I.T.U. membership: 24 countries.
I.A.R.U. Societies: 20.
Without I.A.R.U. Societies: Four countries.

Some Amateur populations:
U.S.A. 270,000.
Argentina 6,000.
Brazil 9,000.
Canada 11,000.
Uraguay 3,500.
Venezuela 2,300.
Panama 80.
Peru 810.
Costa Rica 550.
Dominican Republic 200.

REGION 1:

Population: 900 million.
Amateurs: 65,000.
I.T.U. membership: 82 countries.
I.A.R.U. Societies: 45.
Without I.A.R.U. Societies: 40 countries.

Some Amateur populations:
Ghana 40.
Israel 210.
Ivory Coast 31.
Lebanon 50.
Mozambique 110.
United Kingdom 12,000.
Zambia 77.

REGION 3:

Population: 2,000 million.
Amateurs: 54,000.
I.T.U. membership: 20 countries.
I.A.R.U. Societies: Nine.
Without I.A.R.U. Societies: Ten.

Amateur population, Region 3:

I.A.R.U. members—

Australia 5,100	Japan 45,000
Burma 25	Malaysia 125
Ceylon 53	New Zeal. 3,350
Korea 75	Philippines 50
India 460	

China (I.A.R.U. membership held up) ??

Non I.A.R.U. members—

Afghanistan 1	Nepal 2
Cambodia ??	Pakistan 50
Indonesia ??	Singapore 52
Iran 43	Thailand 16
Laos 7	Vietnam ??

of the population which is particularly relevant to matters of social development, such as the hobby of Amateur Radio.

WHAT IS THE I.A.R.U. DOING?

The foregoing material points a fairly gloomy picture as far as our own region is concerned, especially when we try to relate it to the question posed at the beginning of this article. Even where Amateur Radio is tolerated a look through the foreign section of the Call Book will show in many instances the lack of names and addresses of indigenous Amateurs, i.e. those native to the country. More often we find European names and/or addresses.

However, the problem of how to attract nationals to Amateur Radio has been tackled in other regions, with several conferences resulting in unanimity of agreement on plans for the Amateur Service in the region—expanded emergency nets, "intruder watch" details (A.R.R.L. receive over 1,000 intruder reports each month) and methods of **promoting Amateur Radio in new and developing countries.**

In an effort to encourage this promotion where Amateur Radio is not firmly established, the I.A.R.U. headquarters has been working with groups in Africa and Asia. Various items of training equipment have been shipped to groups sponsoring training classes for new Amateurs.

In Liberia a number of Amateurs have been created as a result of this programme and some progress has been made by the A.R.R.L. and the R.S.G.B. in Nigeria. Amateur Radio literature has been widely distributed in Africa and Asia through many organisations and clubs.

The latest I.A.R.U. Calendar or bulletin lists the following countries that have received literature, code practice oscillators and telegraph keys: The Gambia, Liberia, Sierra Leone, Morocco, Ghana, Nigeria, Malawi, Niger, Cameroun and Laos.

REGION 3 AND THE I.A.R.U.

It must be confessed that the I.A.R.U. and Region 3 as a whole have, as yet, not developed to the same degree as in the other regions. In the light of the fact provided earlier, this is to some extent understandable but efforts must be made to rectify the situation. A glance at the table shows the Amateur population to be nearly 55,000, but with 90% of this total in three so called "Amateur orientated" countries, viz. Japan, New Zealand and Australia.

The strength of active Amateur Societies in Regions 1 and 2, such as the R.S.G.B. and the A.R.R.L., and their proximity to other strong and active Societies have made their task a little easier and provided an example Region 3 would do well to heed.

CONCLUSION

This then is the story of the I.A.R.U. to date, a story which is by no means completed. Throughout these series of articles the main points made can be summarised as follows:

1. The voting countries comprising the I.T.U., the international frequency regulatory body, may vote to maintain the status quo when Amateur frequencies are discussed.

2. The growth of the Amateur Radio Service in new and developing countries may lead to Amateur orientated administrations.

If one believes in what came first, the chicken or the egg, the converse may also be true when considering countries where **nationalist** Amateur Radio does not exist.

It would seem that Region 3 has some homework to do. The logical unit for the implementation of any "aid" programme in Region 3 is the I.A.R.U. In collaboration, the Amateur Societies best equipped for the task are the W.I.A., New Zealand and Japan.

Finally, in the English dictionary, "to dare" is to have the courage to try. The I.A.R.U. programme for promoting Amateur Radio is DARE—Developing Amateur Radio Everywhere.

P. D. WILLIAMS,
Asst. Fed. Sec., W.I.A.

FACT SOURCES

"QST," R.S.G.B. "Bulletin" (various).
I.A.R.U. Calendars.
I.A.R.U. Constitution.
Notes prepared by Author for 1966-67.
Federal Convention minutes.
Oxford Atlas.
Stanford Report (A.R.R.L.).

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TECHNICAL CORRESPONDENCE

(Continued from Page 14)

Furthermore, BV_{CES} (voltage from collector to emitter, with base shorted to emitter) will only be equal to BV_{CEO} (open base) for some transistors. For most transistors, BV_{CEO} may be as little as 50% of BV_{CES} (though BV_{CES} is usually about = BV_{CBO}).[2, 5] This means that if the base circuit resistance is increased, as when adding a base leak, the collector voltage rating will decrease considerably above a certain value of R_{BE}. I have found the value of R_{BE} giving a V_{CE} half way between the shorted and open base value, to be of the order of 3K for small general purpose transistors, 30K for small (TO-18 case) fast switching v.h.f. transistors, but only a few hundred ohms for power transistors; the higher the power, the lower the value of R_{BE} for a given BV_{CER}.[6] All the more reason for avoiding extra base bias, or at least putting it into the emitter rather than the base circuit.

Further information on transistorised transmitters has been published in several issues of "73", as given in the Bibliography by VK3ZRY, as well as the articles in the September and October 1966 issues of "A.R.," and in the "E.E.B."(1-4, and continuing) In addition, quite a lot of good material is available from the Applications Notes published by Fairchild and S.T.C., particularly the latter if one can extract it from them.

—R. L. Gunther, VK7RG.

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1. "E.E.B.," April 1967.
2. "E.E.B.," May 1967.
3. "E.E.B.," June 1967.
4. "E.E.B.," August 1967.
5. "E.E.B.," October 1966.
6. "G.E. Transistor Manual," 7th ed., ch. 1.
And don't overlook the excellent set of transmitters in the "R.C.A. Transistor Manual."

NEW CALL SIGNS

MAY 1967

VK1AN—R. C. Elliott, 37 Ingamells St., Garran.
VK1GD—J. D. Phelan, 1 Beagle St., Red Hill, Canberra.
VK2KK—E. L. Groves, 47 Walder Rd., Hammondville.
VK2AMW—Illawarra Section of N.S.W. Division of W.I.A., 21 Toorak Ave., Wollongong.
VK2BFB—F. B. Crum, 19 Wyalong St., Burwood.
VK2BJV—J. Vidale, 738 New South Head Rd., Rose Bay.
VK2BPC—P. J. Corbett, 84 Yerrick Rd., Lakemba.
VK2ZJU—D. B. Judd, 2 Skinner Pde., Roseville.
VK2ZJZ—D. P. Johnstone, 5 Wells St., Adamstown.
VK2ZMR—R. Miles, Station: 19 Oaklands Cres., Dundas; Postal: P.O. Box 36, Dickson, A.C.T.
VK2ZTO—S. R. Olney, 6 Mimos St., Denistone.
VK3QK—J. E. Loftus, 39 Malahang Pde., West Heidelberg.
VK3TR—L. C. Sawyer, 86 Marine Pde., Elwood.
VK3YB—R. R. Babb, Elmo Rd., Montmorency.
VK3YO—M. L. Bartlett, 42 Boyd St., Dandenong.
VK3AIH—C. Heemskerk, 122 Garden St., Portland.
VK3AVH—V. W. Hercus, 3 Harrison St., Mitcham.
VK3AYH—E. A. Hayward, 88 Abbotsford St., North Melbourne.
VK3ZBW—J. Brough-Smyth, 58A Phillipson St., Wangaratta.
VK3ZDZ—N. W. Cox, 20 Belford St., Ballarat East.
VK3ZJC—J. J. L. Martin, 11 Victoria Ave., Mitcham.
VK3ZLL—L. R. Ferris, Broughton, via Nhill.
VK3ZMI—J. H. Mitchell (Dr.), 15 Willis St., North Balwyn.
VK3ZPV—V. G. Punch, Jnr., 8 Carlisle St., Preston.
VK3ZQZ—J. McL. Bennett, 56 Lancaster St., Ormond East.
VK3ZSO—J. A. White, 84 Winmallee Rd., Balwyn.
VK3ZTP—P. C. Lakeman, 11 Tanjil Cres., Yallourn.
VK3ZUA—A. E. King, 97 Campbell St., Heathmont.
VK3ZUY—N. J. Guy, Railway St., Rupanyup.
VK3ZVH—H. W. Anders, 325 Waverley Rd., Mt. Waverley.
VK3ZVJ—J. E. Brown-Sarre, 31 Laurel St., Redcliffs.
VK3ZWX—R. A. Williams, Station: Mobile; Postal: 91 Balmoral Ave., Pascoe Vale South.
VK3ZXM—M. E. Crisp, 84 Breed St., Traralgon.
VK3ZXR—J. E. Rising, 164 Centenary Rd., Melton.
VK3ZXZ—D. B. Adlam, 60 Nunn's Rd., Mornington.
VK3ZZS—P. R. Seddon, 3 Cobden St., Ballarat.
VK3ZZW—D. I. Wallace, 14 Noyes St., Highett.
VK4CU—E. J. Coan, 7 Glendower St., Toowoomba.
VK4DJ—D. J. McGrory, 74 Hanbury St., Bundaberg.
VK4EX—L. B. Noseda, 10 Rose St., North Ward, Townsville.
VK4LG—L. G. Reynolds, Station: Hillcrest Ave., Hallmarkess, Caboolture; Postal: P.O. Box 153, Caboolture.
VK4LZ—L. W. G. Bell, Station: Lelet Farm, Jubilee Pocket, via Proserpine; Postal: P.O. Box 290, Proserpine.
VK4XC—J. R. Morgan, Station: Tooth St., Nobby; Postal: P.O. Box 9, Nobby.
VK4XI—D. D. Kinnersley, 27 Oxley St., Edge Hill, Cairns.
VK4ZGC—McC. G. McCullock, 210 Banks St., Alderley.
VK4ZMD—A. R. F. McDonald, Motelodge, Takaluan St., Bundaberg.
VK4ZNC—N. C. Cooper, 40 Livermore St., Redcliffe.
VK4ZRT—R. C. Atkinson, 136 Marshall Lane, Kenmore.
VK5HS—K. J. Skewes, 11 Swan St., Risdon Park.
VK5IC—D. H. Watkins, 11 Everard St., Glen Osmond.
VK5KG—K. G. McCracken, 5 Spencer St., Mt. Lofty.
VK5ZAK—A. O. Kwitko, 11A James St., Prospect.
VK5ZAR—A. W. Attema, 11 Oxford St., Hillcrest.
VK5ZAT—C. A. Pay, 641 Brighton Rd., Seacliff.
VK5ZCQ—J. A. McLachlan, 7 Austral Tce., Morphetville.
VK5ZED—J. B. Dennis, 9 Wainwright St., Clarence Gardens.
VK5ZIK—D. W. Carr, Jeffrey St., Lobethal.
VK5ZKK—R. M. Pullem, 5 Eaton St., Cumberland Park.
VK5ZKN—N. K. Kohler, 15 Jury Ave., Rostrevor.
VK5ZLJ—L. Janes, 2 Boothey St., Mt. Gambier.
VK5ZLT—I. J. Cooke, 622 South Rd., Glandore.
VK5ZNB—C. L. Bottrall, 136 The Terrace, Port Pirie.
VK5ZRP—R. J. Phoenix, 53 Gloucester Ave., Belair.
VK5ZSD—R. K. Graham, Flat 1, 53 Richardson Ave., Glenelg North.
VK5ZSP—R. G. Payne, 6 Roynton St., Cowandilla.
VK5ZUL—L. A. M. Voskulen, 26 Bakewell Rd., Evandale.
VK5ZXR—G. A. van der Harst, 21 Dudley Cres., Marino.
VK6ID—I. D. Priestley, 37 Amberley Rd., Balga.
VK6PV—D. B. Shaw, C/o. O.T.C. Satellite Station, P.O. Box 98, Carnarvon.
VK6US—North West Cape U.S. Naval Radio Station Club, U.S. Navcomsta, North West Cape.
VK6ZBX—B. R. Pryor, 20 Canara St., Balga.
VK6ZGP—G. J. Percival, 84 Blencowe St., West Leederville.
VK7ZJM—J. M. G. Vout, 32 Coleman St., Moonah.

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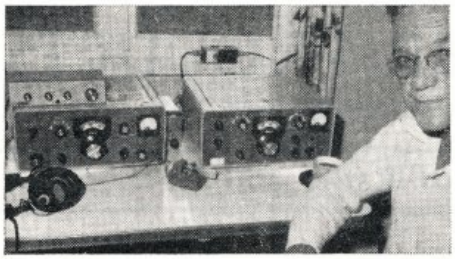

PACIFIC DX-PEDITIONER

Photograph shows Bob VK2BRJ/9 and ex W4CHA during his recent stint from Norfolk Island. He ran up 6,000 QSOs and approx. 100 countries in a matter of a few weeks. He is an A1 c.w. operator. Next trip for Bob will be to Nauru if he can obtain a licence and arrange other details—early in 1968.

Equipment shown is a KWM2 and 75S-3 with a Q multiplier on top, electronic keyer is between. The antenna was a Hy-Gain 14AVQ with 20 radials. Bob always has a big signal from his home QTH at W4CHA. Give him a buzz, he's a nice guy.

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Publications Committee Reports

The August meeting, being held too late in the month to report in this issue, we restrict ourselves to the following acknowledgments: Correspondence from VKs 2QL, 2AXK and 5JT. Technical articles from VKs 3ZRY, 3ZSC and 6KK.

We specially thank all those club and divisional secretaries who responded to our letters on the subject of the Call Book. These were far too numerous to list.

As at the time of writing, the printing of the Call Book is all ready to go, we are only waiting the final okay from the P.M.G's Department.

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7th ALL ASIAN DX CONTEST

1966 OCEANIA RESULTS

(Australia)			
VK9GN	M	3210	
VK3AXK	M	2844	
VK7SM	M	2054	
VK3APJ	M	460	
VK9CJ	M	450	
VK4LT	M	420	
VK3ABR	M	100	
VK3ABA	21	64	
VK4CK	21	18	
VK2APK	14	1703	
VK8HA	14	615	
VK2QK	14	111	
VK4JF	14	15	

(Philippine Is.)		
DU1CL	21	0
(Tahiti)		
FO8BJ	21	38
(Guam)		
KG6AAY	M	5124
KG6AQA	14	1199
(Hawaii)		
KH6IJ	M	2820

CONTEST CALENDAR

9th/10th Sept.: 13th W.A.E. DX Contest (Phone Section).

16th/17th Sept.: Scandinavian Activity Contest, 1967 (C.w. Section).

23rd/24th Sept.: Scandinavian Activity Contest, 1967 (Phone Section).

7th/8th Oct.: VK-ZL-Oceania DX Contest (Phone Section).

7th/8th Oct.: W.A.D.M. C.w. Contest.

14th/15th Oct.: VK-ZL-Oceania DX Contest (C.w. Section).

14th/15th Oct.: R.S.G.B. 21/28 Mc. Telephony Contest.

21st/22nd Oct.: "CQ" W.W. DX Contest (Phone Section).

28th/29th Oct.: R.S.G.B. 7 Mc. DX Contest (Phone Section).

11th/12th Nov.: R.S.G.B. 7 Mc. DX Contest (C.w. Section).

25th/26th Nov.: "CQ" DX Contest (C.w. Section).

VHF

Sub-Editor: CYRIL MAUDE, VK3ZCK
2 Clarendon St., Avondale Heights, Vic., 3034

News this month has been received from VK2, VK4, VK5 and VK6. The VK7 correspondent phoned to say that activity in the northern part of the Apple Isle is virtually non existent mainly because of the weather and good t.v. shows. There is no DX activity to report.

Remember Noel VK3ZPQ would like any reports of the VK0CR 6 metre beacon on 52.9025. Until next month, 73, Cyril 3ZCK.

NEW SOUTH WALES

The July meeting of the V.h.f. and T.v. Group was treated to an informative and interesting lecture regarding the selection of components for use at v.h.f. The lecturer, Barry 2ZAG, has been employed in the components field for many years and spoke with authority on the subject. The v.h.f. committee endeavour to arrange lectures of interest to members for all group meetings and at the same time keep business discussion to a minimum. Meeting night is the first Friday of each month at Wireless Centre, Crows Nest. Visitors are always welcome.

The sub-committee in charge of v.h.f. group communications at Wireless Centre are making good progress and at last report had nearly finished arrangements for 2 mx tunable reception at the Centre. Plans for the 144 Mc. transmitter are also well consolidated with some thought being given to other v.h.f. frequencies. This has been a labour of love by the sub-committee and offers of physical labour or donations of equipment, of reasonable vintage, would not be unwelcome.

On Sunday evening, 23rd July, after the evening broadcast, a scramble was held with separate divisions for net frequencies. The heterodynes, etc., on 53.866 a.m. and signal blanketing on 146 f.m. would have to be heard to be believed. With the population on 53.866 now reaching into the lower 20's it would appear the alternative use of channel 1 or 2 will soon be a necessity.

An upsurge in activity on 146 Mc. f.m. has been noted in country and city districts since the last release of f.m. carphones by W.I.C.E.N. Before long it may be possible to drive over very long distances throughout the State and remain in touch with at least one other 146 Mc. operator.

Of future events the most important is the New Year Field Day. This event will take place on Dec. 30, Dec. 31 and Jan. 1. Many portable and home stations will be active. The V.h.f. Contest Committee would like to hear of interstate v.h.f. stations who may be mountain-topping during this period.

Incidentally have you heard the latest information of research into plating of metal used in antennae. It seems that most plating processes have a deteriorating effect on the radiating efficiency of antenna elements. Galvanising in particular has been reported by one laboratory to have caused a drop in efficiency from 13.5 db. effective gain to 6 db. effective gain. Untreated aluminium still rates high in the efficiency race but DO NOT treat it with metallised paint.

Plans are in hand to expand the population of the two metre band into the top two megacycles. Part of the general plan is to provide an alternative transmission of the Sunday v.h.f. broadcasts on approximately 147 Mc. Remember, use or lose.

The six metre population in Australia is well spread. As well as tunable transmissions, net frequencies are established throughout the two megacycles. For those mobile stations passing down the southern coastal regions in N.S.W. an active net exists on 53.982 Mc. a.m., centred on Wollongong.

The 432 Mc. moonbounce team are still holding regular meetings at Wireless Centre and u.h.f. enthusiasts are welcome. Enquiries should be directed to Gordon Clarke, 2ZXD. 73, Keith 2ZAU.

Hunter Branch.—52 Mc.: The band has been very quiet with only a few coming on the week-end hook-up at 10 a.m., the ones usually heard are 2ZWM, 2ZJG, 2ZMO and 2AYF. Channel 0 has been heard at times and Bill 2ZWN has seen signs of other channels coming across Channel 2, but no dice on 52 Mc.

144 Mc.: This band has been fairly good at times and some have worked Sydney. Two new call signs have appeared in the district recently, they are VKs 2ZSI and 2ZYK. The Hunter Branch has started 144 Mc. scrambles for their members only, with two scrambles a month until next March, when the winner will receive a good prize. 73, Mac 2ZMO.

VICTORIA

Activity on the bands has been reasonably good with quite a few new stations appearing both on 6 and 2 metres. There has not been much in the way of DX on either 6 or 2 mx.

At the July V.h.f. Group meeting about 70 members and visitors heard Les 3ZBJ give his talk and practical demonstration entitled "A New Look at V.h.f. Technique—doing it with Semiconductors". This was a very informative and easily understood lecture. Among the demonstrations given by Les were triplers to 432 and 1296 using varactor diodes and the use of a 80 cent transistor as a varactor diode to triple to 432. The r.f. source used for his demonstrations was a home built all semiconductor transceiver. The whole of Les' lecture was taped and country clubs wishing to use it should contact the Group President, Peter 3ZPA.

The Group converter project is well advanced and can now accept orders for the 6 mx converter which has more than adequate gain and a noise figure well below 6 db. For further information on these converters write or phone Peter 3ZPA or the undersigned. These converters use low cost FETs and silicon transistors and will stand a fair quantity of misuse. 73, Cyril 3ZCK.

Gippsland.—Copy from log of DX received over the minor winter peak: 25/6/67, 2022-2035, Ch. 1 t.v. DX good picture reported by 3ZOZ via ground wave; 28/6/67, 1400-1545, t.v. DX via extended ground wave; stations received ABNT3, TNT9, ABRV3, BTV6, ABEV1, BCV8, and ABSV2 Swan Hill; 1450-1805, N.Z. t.v. Ch. 1, good pix; 2/7/67, 1547-1621, Es Brisbane Ch. 0 t.v. (nil Ham sigs).

Rod VK0CR tells us that he hopes to have a 6 metre transmitter going on 53.1 Mc. using c.w. 1830-2030 hrs. daily.

Main activity in the zone has been on 2 mx f.m. chs. A and B. That seems to be all the news for now, quite a few of the boys here are busy building or setting up new gear. 73, George 3ZCG.

QUEENSLAND

The months of June and July have not been very active, probably due to the cold weather keeping everybody glued to their t.v. sets. Anyhow the old regulars are still to be found on 6 and 2 mx but that second CQ may be necessary. Our new President, George 4ZMG, seems to be doing a good job keeping things together in Brisbane. The main topic of interest in VK4 at the moment is the 144 Mc. beacon and a committee has been set up to design, build and complete this long-awaited beacon. Briefly, the beacon will run 100w. keyed m.c.w. to a omnidirectional horizontally polarised array from the Bunya Mountains, which are 3,000 ft high and approx. 100 miles from Brisbane. More will be said on this later when the project is in full swing, but suffice to say that it is hoped that the beacon will be operational within six months.

Apart from the beacon, which is the main project, rumour has it that in the near future a 144 Mc. transistorised s.s.b. transmitter will be considered as a possible group project. 30 watts s.s.b. on 2 metres for $30. Hmm! Sounds good!

On 6 metres DX is sparse and DX QSOs are rare still. ZL t.v. has been strong in Brisbane, but no VK4 contacts have been made. Peter 4ZPL in Townsville says the JAs are scarce now but the last few months have been quite rewarding. ATV0 Melbourne is heard in Brisbane every day. Channel 2 in Sydney can be seen on t.v. sets in Brisbane after ABQ8 shuts down at night.

Bert 4CP is using a Swan to put out a fine 144 Mc. s.s.b. signal, but Bert, please, easy on the carrier insertion! Phil 4ZEP has a new tape recorder but as yet we have not heard it.

Bundaberg Club reports that a 52 Mc. net has been set up on 52.032 Mc. and the group is active on Tuesday evenings at 8.30 and Sunday mornings at 10.30. The group has had several fox hunts of late, and has an active interest in W.I.C.E.N. Recent visitors to Brisbane from Bundaberg were Bob 4ZZE and Bob 4UD.

Finally, do not forget the V.h.f. Field Day on Sunday, 17th September, and the Sunshine State Contest on Sunday, 24th September. 73, Mike 4ZMW.

SOUTH AUSTRALIA

6 mx DX in June, traditionally labelled "Winter DX" was available on June 4 into VK4 and again on the 5th to VK7 when VKs 7ZKJ and 7ZMD were the most prominent signals heard. It would appear though that stations do not tune the band or "one way" skip has been the order of the season.

Doug 8KK has reported at various times he has heard VK5s on the band plus the ever-faithful beacon, but despite persistent calling Doug has not made his presence known. Similar reports between VK2 and VK5 have been rumoured. This is the price that one must pay when net frequencies take preference on bands.

Nonetheless, net frequencies are indispensable when correctly applied for a specific purpose, namely W.I.C.E.N. Under the auspices of the rotund VK5 Federal Councillor and W.I.C.E.N. Co-ordinator, Geoff Taylor, the v.h.f. mobiles on 53.1 and 146 megacycles have been moulded into an extremely capable and efficient emergency communications group. The most recent exercise was held on June 11 when a large scale operation was capably executed. A total of 26 mobiles participated in this exercise which primarily was to provide communications over three most difficult paths, namely Crafers to Victor Harbour, a path of 40 miles over the Adelaide Ranges; Crafers to Moonta, a virtual line of sight contact of 100 miles; and Crafers to Blanchetown, an extremely tough haul of 70 miles through the Adelaide Ranges once again. Troubles were encountered however not unsurmountable as reliable communication was established under emergency conditions.

Col 5ZKR has been dabbling on 432 Mc. 73, Colin 5ZHJ.

WESTERN AUSTRALIA

There has been fair activity on the v.h.f. bands, most of it centred on nets in the 6 mx band. The announcement of a delay in the launching of Australis was somewhat disappointing. Interest in the project has not abated, however, and the extra time can be used to advantage for building and testing equipment.

Charles 6LK, technical editor of the V.h.f. Bulletin, is leaving for the Eastern States soon and Cedric 6CD will be the new editor. We thank Charles for his excellent services and wish him well in his venture.

Turning to s.s.b., there are now six or seven stations able to use this mode on v.h.f. John 6TU has had his arm twisted or something similar and is getting an article on s.s.b. ready for publication. Viv. 6ZCM has built a very compact and simple sweep marker generator, he calls it the Sweemark. How about putting the details in for publication? 73, Laurie 6ZEA.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. Position in the list is determined by the first number shown. The first number represents the participant's total countries less any credits given for deleted countries. The second number shown represents the total D.X.C.C. credits given, including deleted countries. Where totals are the same, listings will be alphabetical by call sign.

Credits for new members and those whose totals have been amended are also shown.

PHONE

VK5MS	317/338	VK4HR	287/304
VK3AHO	314/326	VK4FJ	279/296
VK6MK	303/320	VK3TL	262/266
VK6RU	303/326	VK4TY	251/252
VK5AB	300/314	VK2AAK	246/250
VK2JZ	288/304	VK2APK	234/237

C.W.

VK2QL	295/315	VK3NC	266/286
VK2ADE	291/313	VK3ARX	263/271
VK3CX	291/312	VK4HR	260/282
VK4FJ	291/313	VK6RU	258/279
VK2AGH	282/295	VK3TL	251/254
VK2AHQ	281/296	VK3YL	251/268

OPEN

VK2AGH	311/329	VK2EO	295/316
VK6RU	307/330	VK4FJ	295/318
VK2ADE	305/329	VK4TY	291/303
VK6MK	305/322	VK3ARX	281/289
VK4HR	300/322	VK3TL	281/285
VK2VN	300/315	VK2ACX	276/300

New Member:
VK2PF 102

JOE KILGARIFF, VK5JT

Joe, who was 81 years old in May, is still active chasing DX and must be one of the oldest active Amateurs in Australia. He started his activities in Alice Springs in 1926, having bought an A.W.A. m.o.p.a. (parallel 210s) from one of the numerous expeditions looking for "Lasseter's Gold". One of these expeditions was that conducted by McKay. This expedition included the late Kingsley Love, and Joe contacted them on phone after they crossed the West Australian border. His receiver at the time was an American made Wasp.

When the R.A.A.F. Wireless Reserve was formed, Joe joined and relayed traffic to Perth, Kalgoorlie and Adelaide. He had already learned Morse code in 1916 when he was in the traffic section of the East-West Railway.

Returning to Adelaide in 1936, he obtained the call sign VK5JT and set up operations at Erindale, where he was active until 1939 when Amateur Radio ceased "for the duration".

In 1940, Joe (then aged 40) joined the R.A.A.F. and was sent to Parafield to set up his transmitter. At the time the R.A.A.F. was short of transmitters and Joe had an all-band 80 to 10 metre rig. With this equipment he maintained contact with Laverton and Point Cook for a couple of years until Adelaide W/T commenced service. While at Parafield, Joe met his two sons, Kevin (bombers) and Leo (fighters), training at Parafield. His son, Joe, was in radar in New Guinea.

After the war, he again started Amateur operations and worked the world with various types of antennae, etc. At present he is enjoying excellent DX with Europe, his equipment being a 100 watt all-band transmitter and AR88 receiver. His antenna is a TA33, thirty feet high. He is also experimenting with a 7 Mc. ground plane. With the beam south-east he can work Europe and U.S.A. at the same time. Uses ten and fifteen at times, but finds mostly JAs on these bands.

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CHANGES FOR MOBILE RADIO TELEPHONE SERVICES

The Postmaster-General, Mr. Alan Hulme, has announced that the growing demand in city areas for Very High Frequency mobile radio services has put considerable pressure on the existing allocation of v.h.f. channels.

Mr. Hulme said that to solve this problem and to meet future demands, the Post Office is requiring land and harbour mobile radiotelephone services which have not already done so to change their channel operations from 60 or 120 Kc. to 30 Kc. by 30th June, 1969.

The new requirements which involve equipment changes, effect approximately 1,400 base stations throughout Australia serving some 14,000 mobile units. The type of services involved include public utilities, such as power and gas authorities, ambulances, police, and fire brigade departments and private organisations such as taxis, carriers, tow truck operators, doctors and building contractors.

Manufacturers of mobile radiotelephone equipment have already been consulted about the new requirements which are to be implemented completely by 30th June, 1969.

Mr. Hulme said it would be of considerable assistance if users of mobile equipment make the conversion as soon as possible, and avoid leaving alterations to equipment until the last months of the period allocated for this purpose. Early conversion will also assist manufacturers in meeting delivery dates for equipment.

Generally speaking it will be necessary to install new transmitter/receiving units at base stations, but adjustment only will be necessary in the majority of cases for mobile equipment.

In introducing the new frequency requirements the Post Office has been guided in its action by the recommendations made in 1961 by the Radio Frequency Allocation Review Committee under the chairmanship of Sir Leonard Huxley.

After careful consideration of the needs of operators and manufacturers, the Post Office has adopted the following programme for conversion, which it is anticipated will cause the least inconvenience to all concerned.

In 30 Kc. channelling areas v.h.f. mobile radiotelephone services (excluding the International Maritime Mobile V.h.f. Radiotelephone Service and the existing Departmental V.h.f. Radiotelephone Subscriber's Service) operating within the frequency bands 70-85 Mc. and 156-174 Mc. shall comply with the following arrangements:—

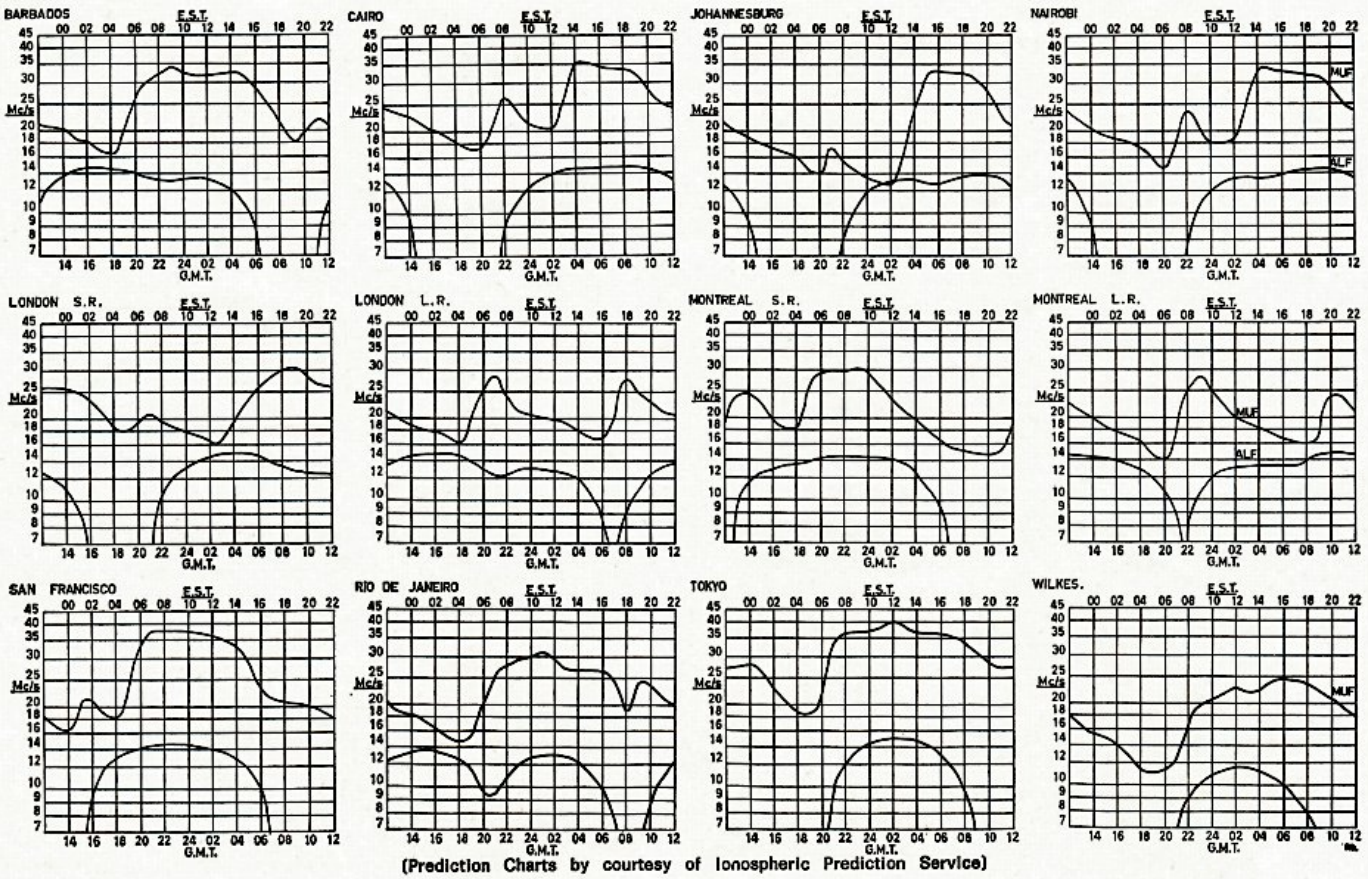
As from 30th June, 1969:—

(1) All base station transmitter/receivers (both amplitude and angle modulated) employed in a base station installation shall be of a type complying with the relative Post Office Specification and approved for 30 Kc. operation, and shall be operated in accordance with the terms of that Specification.

(2) All angle modulated mobile transmitters shall be adjusted to function with a maximum deviation of plus or minus 5 Kc.

Further details of these requirements can be obtained from the Superintendent, Radio Branch, P.M.G. Headquarters, in all States.

PREDICTION CHARTS FOR SEPTEMBER 1967



(Prediction Charts by courtesy of Ionospheric Prediction Service)

DX

Sub-Editor: ALAN SHAWSMITH, VK4SS
35 Whynot St., West End, Brisbane, Qld., 4101

Activity on 14 and 21 Mc. is reported as quiet this past week or two. However, the mail bag is bulging with DX info. So let's delve into it right away.

NOTES AND NEWS

LIDXA, Long Island DX Association: This club always has its bi-monthly bulletins right up to date and forwards the following:

S. Georgia: Dave VP8IE is now on s.s.b., usually around 0100z. Gear Galaxy V.

Maldives: Colin VS9MB on daily 1050 14233.

Cuba: CO3BY 14060 1045z.

Gabon: TR8AG 14180 0600z. If QSO made after 1st July, send QSL to Jorge Brance, Rua Eng Carlos Amarante, 209 Porto Portugal.

East Malaysia: 9M8II 14040 1620z.

Canary Is.: EA8FG 21350 1625z.

Senegal: 6W8DX 14240 2000z.

Mozambique: CR7DS 14203 2400z.

S. Shetland: VP8XZ 14200 0430z. QSL R.S.G.B.

Libya: 5A2TZ 14200 0200z. QSL P.O. Box 1763, A.P.O., N.Y., 09231.

Guyana: 8R1G 14246 2300z.

Cameroons: TJ1QQ will be here for three more years. Has various fqs. on s.s.b. Try listening around 0600 and 1900z.

Burundi: 9U5DP 21360 2000z. QSL W2SNM.

Cape Verde Is.: CR4BC 14234 2214z.

Rio de Oro: Active again 14125 2030z.

Jan Mayen: JX3W 14194 0230z. QSL LA1NG.

Gambia: ZD3D 14213 2100z. QSL P.O. Box 10, Bathurst, Gambia.

Tromelin: FR7ZL active again, s.s.b. and c.w. mode. 1700z and later.

Somali: 6O1GB 21350 1800z.

Mauritius: VQ8CA 14195 1210z.

Tunisia: 3V8BZ 14185 2330z. QSL DL7FT.

Saipan: KG6SA 14203 1425z. QSL C/o. U.S.C.G. Navy 935, Box 338 F.P.O., S.F., 96950.

St. Vincent: VP2SAB 14205 2240z.

Niger: 5U7AL 14196 0300z.

C.A.R.: TL8DL 14180 2300z.

Iceland: TF2WKH 14217 0050z.

Turkey: TA2BK 14027 2330z. QSL DJ2PJ.

Bahrein: MP4BJL 21304 1900z.

Cyprus: ZC4PC 14193 1950z. ZD4IP 21040 0000z.

Aland Is.: OH0AA 14 s.s.b. 0400z. Also OH-0HM 14033 2100z.

Ivory Coast: TU2AY 21318 1200z.

Seychelles: VQ8BC 21419 1700z.

Isle of Man: GD3AIM 21020 2000z.

Basutoland: ZS8L 14136 1600z.

West Pakistan: AF2NMK 14300 1945 and 2035z.

Trucial Oman: Roger, who gave so many VKs QSO, is now QRT and back home. He made 20,000 contacts in the short time he was there.

Jamacia: 6Y5JB 14058 1200z.

Congo Rep.: TN8BB 14219 2000z.

Jerusalem: 4X8HW and 4X8TP are good for W.P.X. from here. Active s.s.b. and c.w. 14. (Tks. Howard, WB2EPG.)

Air Waves: This is the bulletin sent out monthly by J. Coote, G3UGT, DX Editor in the U.K. He supplies these items:

Gibraltar: ZB2AM is now back home in U.K. ZB2AB, ZB2AP, ZB2AZ are all QRV 14 Mc. c.w. ZB2F is a pirate.

St. Helena: ZD7WR is a beacon station 28983 sending test de ZD7WR. There are also active beacons on 50 and 70 Mc. from here. Reports to ZD7WR please.

Vietnam: K8HVN/XV5. This contact is acceptable for A.R.R.L. DX credit. (??)

Sakahlin Is.: UA0ER, UA0FF, UA0FM all busy on 14 c.w. now. Zone 19.

Port. Timor: CR8AH is on a.m. 21190 1245z. Will work s.s.b. stations.

Chatham Is.: ZL4MO, ZL4PM hope to be active from here in Nov. or Dec. next for a good stint. (Tks. Jim OB.)

Directory of Islands: More info on this 18-page booklet can be had from Geoff Watts who also puts out a weekly DX News-sheet and kindly supplied these items:

Tuamotu Arch.: FO8BU 14102 s.s.b. 0630z.

Guernsey: GC8HT. Dick very active on various bands, s.s.b. and c.w. Try these times, 0600z 14, 2300z 21 Mc.

Christmas Is.: VK9XI 14108, 21172, 14025. QSL W2GHK.

Curaco: PJ3CC 14255 2158z. QSL WB2POH.

Aruba: PJ4AE 21246 2035z. P.O. Box 186, San Nicholas.

Bonaire: PJ5BF 21380 2130z. QSL W2CCE.

Inner Hebredes: GM3TXX/P 21321 1855z. QTH Isle of Skye.

Shetland Is.: GM3RFR 7077 2040z. Also GM-3SVK 14178 0640z.

The Fla. DX'er reports the following:

Sardinia: IS1VAZ 21357 1830z.

Luxemborg and Gibraltar: K1OTA/LX will commence operations in July through August and later. Fqs.: 21015, 28015, 14015, 7015; s.s.b. 28650, 21350, 14200. QSL K1OTA.

Corsica: F9RY 14120 2230z.

Muscat and Oman: VS9OSC 14 s.s.b./c.w. QSL K2KTK.

Willis Is.: John VK4HG, ex-VK3AYH, is working all he can and will be at it till some time in November. John advises to send QSL via VK3 Bureau. VK4HG will be mainly on 14 s.s.b. but will be on other bands as well. Listen for the pile up.

Toronto: VE3FXR, Rog. McNicoll, 44 Smithfield Dr., Toronto, says he is willing to act as QSL manager for any VK going on an expedition. Drop him a line.

From Geo. ZL2AFZ, DX Editor "Break-In", comes the following items:

Mauritius: VQ8CC expects to be on 1.82 Mc. this season. Keep an ear for him in Oceania.

Clear Is.: EI0R will be QRV from here very soon now.

Ile d'Oleron: DJ9AU 14125 2030. QSL R.E.F.

Walney Is.: G3OPI, 14 and 21 at 0645 to 0730, from 1200-1230z.

Scilly Is.: GB2IS uses 21050 from 0800z.

Mongolia, Zone 23: UA1CK/JT1, Vlad, most days on 21345 s.s.b., at 0700z.

Marcus Is.: KG6IF, 14217 s.s.b., 0630z. KG6IJ on Volcano Is. closed down in July and KG6IC will remain active. KG6SN on Mariana uses 14210/220 at 1245. QSL via W7PHO.

Afghanistan: YA5RG frequently on 14, 21, 28 Mc. s.s.b. on sked 14300 Monday, Friday, at 1630z. QSL via DL6ME.

Hong Kong: VS6AZ, listening 14280 operating 14195 at 1500z week days.

Ascention Is.: ZD8J on 14023 from 1530z. QSL via W4DQS.

Easter Is.: CE0AE 21340 at 0500z. QSL via "Ham Shack," Box 915-517, Albrook, A.F.B., Canal Zone.

Faeroe Is.: OY9IM s.s.b. 0300z, 14215. Also active is OY7ML 1800z, 14052 c.w.

Grand Caymen: ZF1GC 14189 s.s.b. 0300z. QSL to VE4DQ.

Activity coming up from Balearic Is. and Tunisia by DL7FT and VP5RB, also China by JA3IU, Andorra by W2OEH (PX1EH), Starbuck Is. and Kingmans Reef by WA6ZZD. More info if it comes to hand.

Rarotonga: ZK1CI will be active for the next three years from here. All bands 80 15 c.w. and phone. He is ex-ZL1AWT. QSL to P.O. Box 103.

Wake Is.: WA4QXB/KW6 14050 1600z. (VK-4UC)

Cocos Keeling: Barry VK9ZCF writes to say that the report of activity by ZC2T is incorrect. The former call is the only one in use on the island. Barry does not have a full permit so he will be restricted to 6 mx. Keep an ear out for him. He sure would like to work VK when conditions are suitable on 50 Mc. He will be as active as he can. QTH C/o. D.C.A.

Next burst of activity by DX-peditioner Don Miller, W9WNV, is reported to take in the following choice ones:

VQ8 Rodrigues, VQ8 Brandon, FR7 Tromelin, FR7 Europa, IG Guyser, LA Bouvet, VU Laccadives, YI Iraq, ZA Albania, KC4 Navassa, VP8 three locations, EA9, 0 three locations, XU Cambodia, and more new ones.

By the time you read this, Don should have begun this frenzied trip, so keep an ear to the usual fqs.

Franz Josef Land active again. UA1KED 14005 2300z. Yemen: 4W1C 14102 1930z. Svalbard: JW3NI 14036 0300z. Laos: XW8CAL club station. Reunion Is.: FR7ZN 14210 1100z. Israel: 4X6 Gaza Strip. 4X7 Syrian Ter. 4X8 Jerusalem. 4X9 Sinai. Greece: All stations will be QRT from here. Afghanistan YA1AN 14006 1200z. Taiwan: BV2A 14006 0830z. Nepal: Father Moran still going strong 14 s.s.b. on low end.

ACTIVITIES

David VK3QV reports 10 mx as relatively quiet, but patience does bring a QSO or two. The following are listed as worked: 9V1FF, 5A3TN (on l.p.), VK9OM, KX6DR, KH6NS plus all JA, ZL and W areas, including VK-3DL/W5. All s.s.b. mode.

Merv VK4DV says conditions still holding on 20 mx at his QTH in Nth. Qld. He has already earned himself the VE Centennial Award which is no mean effort. He lists these good 'uns: ZD7KH, ZD7D, ZS1CD, ZS-2RM, TI2CAP, XE1BL, XE1KB, YS1JC, OK-1AGH, YU1YG, YJ1DL, ZD3G, CR6IV, CR6EW, CR4BC, K8NHW/XV5, etc. (Nice list OM.)

Chas VK4UC writes to say that the bands are only mediocre. He picked up the following on 20 mx: CR6EI 0630z, DJ2PT 0500z, DJ-0RM 0400z, F8WK 0600z, G2DF 0620z, HB9GN 0600z, I1BRM 0700z, I1MOC 0630, I1KE 0630z, PA0CE, OZ3PO 0600z, UT5CC 0600z, UA1KAN 0200z, XE2XG 0515z, YO2AAF 0300z, YU1NNB 0730z, YV5BPJ 1200z, ZC4CN 0500z.

Best QSLs received: EA4CR, HS1HM, KV-4AM, ZS5EY, ZE8JW, OX3KM, VS9HRV, 5N2ABD, 5N2AAF, CR7IZ, CR7CI, CR4BC, ZE-4JS, KZ5JF, FB8WW, ZL1AI (Kermedecs).

Chas. reports ZD9B as active 14040 around 0600z and workable in VK4.

Peter VK4PJ says the band to Africa good around 0600z and later. Also Canadians in the early evenings our time. He logged these QSOs on 14 s.s.b.: I1ARS, G3LNS, G3KDB, PY2PA, I1MEC, SM7CSN, OK1AMD, I1KRO, UY5XS, UA3AN, SM7TQ, YU2HDE, IT1PEE, I1KLX, 8R1G, OH3PB, PY1GV, UC2AA, IS-1VAZ, OE1GWA, OE1BFW, G3NMH, OZ8RH, VP8HZ, YU7LBE, F5CZ, SM2BHX, ON5DH, EA8FG, FK9BK, 9G1TV, TI2JCC, XE1AAN, EA8BQ, plus many VEs.

Dud VK4MY now back on s.s.b. (and c.w.) and notched these on 20: DJ7ZG, 5U7AC 15113 0700, CR6BX 14110 0715, VE2IZ 14180 0645, YV1TP 14180 0720, VK9GC Rabaul 0730, TU2BD 14130 0755, CR6AI 14022 0800 on c.w.

An interesting letter from VK4DU (another emigrant to the Gold Coast from VK3), who appropriately signs himself "Viva la QRP". Using less than 9 watts and a simple antenna and doubling in the final, Keith really has been working the DX on 21 Mc. He lists these as a few samples: DL1ES, SP8HR, YV5BPJ, OK-1VK, CN8FB, CN8FV, UA0MT, OE6SWG, I1GSP, CO2BB, YU1BCD, ZC4CI, JA4NDJ, ON5ZO, 9J2HZ, F8TQ, LZ2ZZ, 3C2AKQ, DJ6SI.

Keith asks "How QRP can you go?" He records the following experiment. I quote him, in brief, "After working W6GBI and getting S8, I reduced power at his request to less than 1 watt. He gave me 569. Then I took off my antenna, leaving about 5 ft. of it hanging over my head in the shack. Report was 559. I left the set-up as was, and next day again called CQ. Back came W6GBI with 569. The following day (still QRP 1), I was in QSO with W5TG when VK4DY and VK-4RZ arrived to verify the truth of things. I can work DX easily from this QTH with this power."

If you are holidaying on the Gold Coast, a peep at Keith's QTH is worth while. His shack is perched right on top of Currumbin Heights and commands a breath-taking panorama to the north and south and of the Pacific and all points east. No wonder DX is a piece of cake.

SOME QTHs (from Merv VK4DV):

ZD7KH—K2HVN.
ZD7DI—R.S.G.B.
7Q7EC—Box 207, Zomba, Malawi.
K8NHW/XV5—W6FAY.
YS1JC—P.O. Box 1368, San Salvador.
XE1KB—P.O. Box 907, Mexico City.
ZD3G—K6ENX.
YJ1DL—Dave Laing, Luganville, Esperanto, Santo, N.H.
CR6IV—P.O. Box 737, Benguela, Angola.
ZS8L—W4BRE.
CR4BC—P.O.B. 36, St. Vincent, Cape Verde Is.
KS4CC—WB6ITM.
9Q5BY—P.O. Box 1459, Kinshasa, Rep. of Congo.

OE1 AWARD

1. The W.I.E.N. Diploma (Vienna Award) is issued to all licensed Amateurs in two classes. Class 1, contacts with all 23 Vienna districts; class 2, contacts with 15 of the Vienna districts.
2. The contacts can be made on all bands. Mode: c.w., a.m., s.s.b., or mixed.
3. All QSOs after 1/4/54 are valid.
4. The fee is 1 U.S. dollar—or 8 I.R.C.
5. Mail QSL cards or certified list to Ernst Reisenauer, Vienna 16/107, P.O. Box 23.
6. On the QSLs must be shown the number of the district or the number of the Post Office. A full district list can be had by writing to the above QRA.
8. On the same basis, it is eligible to s.w.l's.

QRP CLUB

The July VK/ZL Newsletter issued by Barry VK5BS shows considerable growth and interest in the club in Oceania. Also, the W.W. membership list (try Barry if you want one) is impressive in calls and members. Some big sig DXers are QRP men. So if you're "an under 100 watter", join the fraternity and help show that you don't need a gallon for long haul DX.

Write to Co-ordinator, VK5BS, 18 Cornish St., Glenelg North, South Australia, 5045.

Once again my gratitude to the column's contributors. 73, Al VK4SS.

SWL

Sub-Editor: D. GRANTLEY, WIA-L2022
P.O. Box 222, Penrith, N.S.W., 2750

Many and varied are the requests which I receive for information on the various aspects of S.w.l'ing, they range from simple queries on how to obtain a listener's number to queries of a technical nature which, if I am unable to answer, are passed on to somebody who can. These queries are rarely discussed through these columns, instead they are answered directly and in many cases the writer is never heard from again. This month, however, I received one from a young lad who, in starting out to buy his first receiver, was saddled with what appeared to be a rather battered AR7 with only a D coil box and no power supply. What this cost him is not the point, even though it was more than I recently paid for my 2nd AR7 which is a complete unit with five boxes. The fact was that the lad had checked the tubes, noted that they were 6 volt filaments, and with his few remaining dollars bought a power tranny with a single 6v. filament winding, a 6X5, two electrolytics and a choke, assembled same with much care, clipped in a speaker (also an extra) and became quite disturbed when the thing didn't function.

At this stage he dropped me a note, and being more or less a local resident, I called and had a look. I pass the diagnosis along in case any newcomer should fall into the same trap. The receiver as I found it was the basic AR7 receiver, covered in layers of dirt, grease and dust. It was probably the worst example of a disposals set I have ever encountered, nevertheless, something had to be done to try and enable this lad to get something of use out of the pile of apparent junk he had obtained. As I had previously built a power supply for my original receiver, I knew that the filaments of the tubes were coupled in series in pairs, thus the filament voltage should be 12 and not the 6 volts our friend had applied. Likewise, his small transformer supplies around 150v. or less at 40 mills., barely enough to supply a small household receiver, let alone a large communications set.

At this stage we could go no further, so at a later date the owner returned to my QTH for further tests. Connecting my power supply produced more signs of life on voltage tests, but also revealed the need to replace four of the tubes, also the previous owner had removed the speaker transformer and this had to be replaced. After all these tasks had been completed, the set went quite well, considering that the coil boxes I used were not aligned to this particular receiver, being in actual fact the ones belonging to one of my sets. What is the point of all this? Well, it is a warning to the newcomer not to walk into the first receiver he sees unless he knows something about it, or at least knows somebody who does.

DX NEWS

The following can be QSL'd via the ISWL Bureau: G8AJ, K6SDR, W4HHN, VP5RS, G3VFH, VE3EVU and W2EQS. MP4TBO was scheduled to go QRT on June 26 and can now be reached at Roger Baines, "Moorefield," Hardstoft Rd., Pilsley, Chesterfield, Derbyshire, England. LJ2X is a Norwegian station. BV2A is the only licensed station in Taiwan. FO8BU operates from Tuamotu Archipelago; QSL to Box 374, Papeete, Tahiti. FY7YM's QTH is BP63, St. Laurent, Fr. Guiana. ZF1RD says QSL via K8LSG. TT8QQ and his other calls used in the current jaunt all via W4DQS. UA9EG is in zone 19. Current pirates at the beginning of June or thereabouts were KS4AD, MP4QAL (who was reported to QSL although unlicenced), ZC2T, ZC2T/VK9, and 1G1HKP. 5LA2FD and 8FD QSL via EL8B. XWs 8BS and BZ via the U.S. Embassy, A.P.O. San Francisco, Calif. 96352, U.S.A.

BAND CONDITIONS

Things have been fairly quiet in the Eastern States this month, with 20 mx still being the main DX band with openings into Europe as early as 4 p.m. E.A.S.T. Over the past weeks some really good openings to South America on this band during mid afternoon, but by 8 p.m. the band has gone flat.

On 15 metres there is quite a lot of general DX prior to sunset, but the JAs seem to have predominance here. I personally have struck only two openings on 6 mx, one this morning (30th June) when I heard 2WI, and some Sydney stations on 18th. The American sideband stations are on 40 metres by the cartload, and the c.w. boys too are quite readable if you can tolerate the QRM.

160 metres is quite inactive up here, but over in VK6, George Allen heard KPH (2045) from San Francisco on July 14th. The sig was 339 and stayed in for an hour. George, by the way, is interested mainly in top band, and reminds us that there are three marker stations nearby, WCC (2036), KPH (2045) and WNU on 2048.

QSL LADDER

Name	Confd.	Heard	Zones	States
E. Trebilcock	293	300	40	50
P. Drew	197	265	38	41
D. Grantley	169	304	39	35
W. Smith	154	215	36	7
E. Luff	146	221	35	36
R. Kearney	117	180	37	8
G. Earl	107	171	34	18
M. Hilliard	100	250	33	14
B. Mutton	81	118	31	11
A. Raftery	79	197	31	13
R. Mackintosh	41	102	20	5

The QSL Ladder is based on the number of countries confirmed, and to become eligible for a position you must have a minimum of ten countries. Names are automatically removed when no letter is received for three months, or when a listener obtains his ticket.

That winds it up for this month chaps, all the best on the DX front and let's have a bumper entry for the VK/ZL Contest this year. It's a terrific contest for the listener, and a really good score can be obtained if you have the time to spare. 73, and all the very best, Don L2022.

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YOUTH RADIO SCHEME

The first issue of "Coryra"—the voice of the Y.R.S. Correspondence Section—has been received and looks very promising. This journal will be a very useful adjunct to the study course and is part of the material each person receives along with the printed notes, and the many other services offered, upon joining the Correspondence Section. The extensive new services as well as many of the old are covered by a new arrangement whereby a fee of $4.00 is charged. Now each member only has to pay his joining fee and nothing more—no s.a.s.e., etc., etc.

David Jeanes, VK2BSJ, Ayr St., Rockdale, N.S.W., is the Publicity Officer for the Correspondence Section and would welcome any pertinent news.

CLUB NEWS

VK2: David Fraser of the Westlakes Club has gained his A.O.L.C.P. and at a recent meeting of the W.I.A. in Sydney was presented with the O.T.C. book prize for proficiency.

Mr. Williamson, the examiner for the Elementary Certificate, advises that five boys recently gained their Elementary Certificates, three with honours and two with credits.

There have been several new registrations of clubs in New South Wales and I presume that this progress will be apparent in other States as well. I would be very interested to hear about this.

VK4: Mr. Danny Dwyer, VK4ZDD, is the new Y.R.S. Supervisor in Queensland and reports a registration so far of nine clubs with the possibility of new clubs at Townsville, Clayfield and New Ireland. There have been several Elementary and Junior Certificates gained. There is also a Y.R.S. net on 40 mx on the first Saturday of each month, so look for VKs 4UD, 4UC and 4NN about 9.0 a.m. It would be very interesting to have some interstate Y.R.S. contacts and someone might think up a special certificate for this purpose for the certificate hunters.

VK5: Mr. Bert Hollebon, VK5EQ, advises that new clubs are being formed at Kadina and Port Augusta. Also, there have been five recent successes in the Elementary.

VK7: This is the first information I have had from Tasmania and it is very heartening to see the spread of Y.R.S. Mr. Reg Emmett, VK7ZAO, has written to say that things are under way with two active clubs so far, at Burnie and Hobart, with a total membership of 41. Out of these, six have already passed their Elementary exams.

That's about it for this month. Many thanks for sending me the news and I look foward to the time when I can list every State in Australia with something to report on each one. Please send all information to me by the last Wednesday of each month. Address: Mrs. M. Swinton, VK2AXS, P.O. Box 1, Kulnura, N.S.W., 2251. 73, Mona.

SCANDINAVIAN ACTIVITY CONTEST 1967

RULES FOR NON-SCANDINAVIANS

1. **Contest Periods:** C.w.—1500 GMT, Saturday, Sept. 16, to 1800 GMT, Sunday, Sept. 17. Phone—1500 GMT, Saturday, Sept. 23, to 1800 GMT, Sunday, Sept. 24.

2. **Contest Call:** Non-Scandinavian stations call CQ SAC on c.w. and CQ Scandinavia on Phone. The Scandinavians use CQ-test and CQ-Contest.

3. **Bands:** 3.5, 7, 14, 21 and 28 Mc.

4. **Objects:** Non-Scandinavians will try to work with as many Scandinavian stations as possible. The same station may be worked once on each band during the Contest. Only c.w.-c.w. and phone-phone QSOs are valid for the Contest. The prefixes used in Scandinavia are: LA (Norway), JW (Svalbard), JX (Jan Mayen), OH (Finland), OH0 (Aland Islands), OX (Greenland), OY (Faeroes Islands), OZ (Denmark), and SM/SL (Sweden). All of these prefixes are geographically not in Scandinavia, but they are considered so for the Contest.

5. **Operating Classes:** Single-operator and multi-operator classes. The club stations, even if operated by one operator during the Contest, are in the multi-operator class. Multi-operator stations may use one or more bands simultaneously, but the exchange number must flow in chronological order.

6. **Serial Numbers:** The serial exchange consists of six-digit (c.w.) or five-digit (phone) number: RS(T) plus No., e.g. 599001 or 59001, etc. Every contestant must start from 001.

7. **Points:** One point for every **complete** contest QSO.

8. **Multipliers:** Maximum of nine per band, consisting of prefixes listed in paragraph 4.

9. **Final Scoring:** The sum of complete QSOs multiplied by the sum of multipliers. There is only multi-band class in this Contest.

10. **Certificates:** Two highest scoring stations in both operating classes separately on c.w. and phone will receive the Contest Award in each participating country as well as in each participating U.S.A. call area. Depending on the number of the contestants in each country the Contest Committee will consider more certifications.

11. **Contest Logs:** The logs are to be filled in the following order: Date, GMT, station worked, sent no., received no., band, note of new multiplier. Separate logs for different bands are not necessary, but a summary sheet showing totals of each band and the final score is required. On this summary sheet the contestant will write plainly his/her call sign, name and full address. Also the operating class to be stated. Separate logs are required for c.w. and phone. The rest of the space on the summary sheet is recommended to be used for personal comments. Finally, the signature of the contestant certifies that he/she fully agrees to the rules, has been working according to them and agrees to the final decision of the Contest Committee. The logs must be mailed before October 15, 1967, to the organising League, **S.R.A.L., P.O. Box 10306, Helsinki 10, Finland.**

12. The decisions of the Contest Committee are final and definite. Right to changes in these rules is reserved.

All S.A.C. participants are requested to confirm each contest QSO with QSL card. This voluntary habit is aimed to foster general QSL policy all over the world.

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JA VISITOR TO MELBOURNE

Nobuo Matsukura, JA3API/MM (2nd radio officer on the "London Maru") photographed with Bill Yates, VK3AHS (left) and Phil Orchard, VK3APO (right) when recently on the way to a Moorabbin Radio Club meeting.

FEDERAL AND DIVISIONAL MONTHLY NEWS REPORTS

(SEND CORRESPONDENCE DIRECT TO DIVISIONAL REPORTER NAMED AT PARA. END)

FEDERAL

CASH PRIZES FOR CONTESTS

Re Item 2.12.1 of 1967 Federal Convention. Federal Executive wish to advise: "That it is the policy of the Institute to discourage the trend towards the presentation of cash prizes for contests."

This matter was decided last Easter in Hobart during the Federal Convention.

LICENSED AMATEURS

May—

	Full	Limited	Total
VK1	70	15	85
VK2	1302	395	1697
VK3	1123	532	1655
VK4	461	173	634
VK5	476	218	694
VK6	272	126	398
VK7	128	71	199
VK8	16	4	20
VK9	62	9	71
VK0	7	0	7
Grand Total ..	3917	1543	5460

W.I.A. MEMBERSHIP RETURNS

(Latest Returns)

	VK2 Jun.	VK3 July	VK4 Mar.	VK5 July	VK6 July	VK7 July
Life	15	15		5	6	7
Full	797	779	?	356	239	141
Assoc.	361	224	?	118	73	71
Others	10	—		19	—	—
Total	1183	1018	477	498	318	219
Prev'us Total	1278	995		544	311	232

Grand total members: Full 2800, all grades 3700. Percentage of members to licensees, approximately 51%.

DX-PEDITIONS AND D.X.C.C.

From A.R.R.L. (the fourth in a series of statements by A.R.R.L. Awards Committee):

". . . It now appears to the Awards Committee that there is little or no likelihood that Dr. Miller (W9WNV) shall be able to supply the minimal information required to give the Committee reasonable assurance that D.X.C.C. credit can be given, or continued in effect for contacts in 1966 and early in 1967 with Dr. Miller's DX-peditions to St. Peter and Paul's Rocks (PY0XA), Chagos (VQ9AA/C) and Heard Island (VK2ADY/0). With respect to the first two, reasonable documentation concerning the manner in which the travel was accomplished has not been supplied. With respect to Heard Island, a question concerning authorisation by the Australian Government continues to remain unresolved. Accordingly, the Awards Committee most reluctantly announces that D.X.C.C. credits for these three operations must be withdrawn."

LIFE MEMBER BADGES

As directed at Hobart, F.E. has ordered and received a quantity of lapel badges for distribution to Life Members. They are similar to the usual badge, but with a green map background and white scroll.

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FEDERAL QSL BUREAU

QSL arrangements for VK4HG, John Humphries, currently at Willis Island and active on s.s.b. only, have been varied. John now instructs that all QSLs be held at the VK3 Bureau. He will handle them himself on his return to the mainland about the end of 1967.

A full set of "CQs" for 1966 is available at this Bureau for free. First to call may have them. If no locals interested, postage is required from others.

The slump to 6,000 in incoming QSLs for June, as expected, proved shortlived. The July total rose to 10,000.

W.W. DX-pedition to the Treasure Island (Isle of Pines), Cuba. Amateurs are invited to participate in this contest organised by the DX-pedition (CO4) to Avalos key, eastern side of the Treasure Islands (Isle of Pines) where a world wide spearfishing contest will take place. Contest period: 2400 GMT, Sept. 4 to 2400 Sept. 7, 1967. Object: To contact with the DX-pedition, several CO4 operators on different bands. Use QSO serial numbers. Scoring: Any CO worked on c.w. 10, or a.m.-s.s.b. 15 points; any CO4 worked on c.w. 20, or a.m.-s.s.b. 30 points. Awards: 1st place, Golden Plaque and Diploma; 2nd place, plate medal; 3rd place, copper medal; 4th to 10th place, diploma. All participants will receive color QSLs. QSOs can be worked out six times on the same band with different operators on c.w., a.m. or both. The different CO4 operators will call on a.m. "CQ Spearfishing Contest" and on c.w. "CQ CS de CO4 . . ." Points will be given as soon as the logs are tabulated. Mailing deadline is October 1 1967 to P.O. Box 6996, Radio Club, Habana, Cuba.

The Radio Club Venezuela were late in the forwarding of advice of their Independence of YV Contest 1967, which was held on July 1 and 2. Logs should be sent to R.C.V., Apartado 2285, Caracas, Venezuela. Results of the 1966 Contest just received show the following VK participants: VK2APK 15,600 points, VK4LT 1,943 points, VK4HR 1,073 points, VK4FA 496 points, VK9DJ 12,958 points.

—Ray Jones, VK3RJ, Manager.

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NEW SOUTH WALES

COUNCIL NEWS

Members will be pleased to hear that Bill 2YB, the Divisional Vice-President, has left hospital and is resting at Crookwell. It will be some time yet before we see Bill at meetings, but his many friends hope that he has a speedy recovery. Bill was going to take portable gear to Crookwell but no signals have been heard so far.

Following the resignation of Councillor Stan Dogger, Council appointed George Wilson, VK2AGO, to Council.

Council has announced that a full-time Secretary has been appointed for the Division and the position has been taken up by Mrs. M. Long. The Secretary will attend Council meetings and attend at Atcheson St. during the week. The hours of business for telephone and personal enquirers are from 9.30 a.m. to 3.30 p.m. on Tuesdays, Wednesdays and Thursdays. Mail enquiries will of course be dealt with as soon as possible and Council hopes that a better service will result to country members. As can be appreciated, a vast amount of work and organisation is required of the new Secretary, so the assistance of members will be necessary to allow the operation to be successful.

In order to assist members further, Council has delegated various departments to Councillors for supervision and these are as follows: C. Wilkins, property and plant; C. Henderson, zone liaison and radio clubs; P. Campbell, W.I.C.E.N. and technical; D. Jeans, Y.R.S. and education; G. Wilson, Treasurer and Executive Secretary; W. Lewis is on sick leave.

Council's membership drive is starting to show results, one member having recruited 15 new members. There were a further 15 applications for membership and 25 re-instatements. Don't forget the slogan, EVERY member get a MEMBER. If you care to beat the record of 15 new members, then have a go! Membership in N.S.W. is still way down so how about it chaps?

RADIO CLUB REGISTER

Councillor Cyril Henderson reports that the register of Radio Clubs is nearing completion and hopes for an early publication of the information. Cyril told "A.R." that he was having some difficulty in obtaining full information on some clubs and asks that clubs send ALL the details of their club. Those few clubs which have ceased could also help by advising the fact to Cyril. Members and club committees are again reminded that the information is required to assist them as well as the Institute and Amateurs in the persuit of the art.

RADIO EQUIPMENT STORE

The Radio Equipment Store is undergoing a facelift and it is planned to have goods in bins with prices clearly shown. The store is to be modelled along supermarket lines with more realistic prices.

N.S.W. CONVENTION 1968

Council has announced preliminary details of next year's Convention. It will be held over the Australia Day week-end in January 1968. On the Saturday the Convention will start with an equipment display followed by the Dinner in the evening. Refreshments will be available all the time and the location will be the Windsor Gardens Convention Centre at Chatswood. Tickets will in the $5 class and 150 will be made available, of which some 60 have been tentatively booked already.

Councillor Dave Jeans advises that the Y.R.S. are going to put out a kit set for a converter to allow reception of 40 and 80 metre bands on b.c. receivers. The kit will most likely contain two coils and a printed board and will use a low cost transistor tunable oscillator design; with the object of keeping the project simple, easy to construct, and easy on the pocket. Dave would welcome any assistance or advice on the project.

JULY MONTHLY MEETING

The Divisional meeting was held as usual on the fourth Friday and was opened at 8 p.m. by Chairman-President Keith Finney. After the reading of the minutes, Keith reported that the Secretary had been appointed and was working literally day and night to catch up on the backlog of work.

Federal Councillor Pierce Healy then introduced David Rankin, VK3QV, to the members and several visitors were then introduced and welcomed by the members.

Chairman Finney then closed the meeting to allow the annual auction to commence and handed the chair and knuller over to Noel 2AQH. Bill 2AGF took the cash—what little there was of it—and Warwick Johnson made book. Noel was just as sharp as ever, but what must be the greatest buyer-resisted auction in history took place. I think it only fair to say that Noel was completely exhausted at the end of the evening. Your correspondent can only put the lack of spirit on this occasion down to either the mob are so wealthy they are only prepared to buy commercial gear or that they are too lazy or busy to build their own gear—or that the art of Amateur ingenuity is dying out.

W.I.C.E.N. NEWS

A total of 132 Carphones have now been distributed to members, of these 61 went to country members and the remainder to the city and Gosford area. Conversion of the units to W.I.C.E.N. channels is by now well advanced as quite a large number of crystals have been supplied to put the units on channel B (146 Mc.). Quite a number of stations are also firing up on channel A as the release of this batch of units will most likely provide almost 190 stations in N.S.W. on channel B.

The meeting of the W.I.C.E.N. Group, which is held the second Friday of the month, will take the form of an adjustment clinic for the recent batch of Carphones.

Work is well advanced on the carpentering side of the room at Atcheson St. for the new communications room. It is expected that the project will proceed steadily until the room is ready for installation of equipment which is being overhauled prior to being installed in the building.

A joint effort is in hand by the group in conjunction with the V.h.f. Group to erect the 40 ft. tower and antennae for the v.h.f. equipment at Dural. Completion of this project, together with maintenance of the equipment, should improve the coverage of VK2WI on all the v.h.f. bands. 73, Stan 2ZRD.

SILENT KEYS

It is with deep regret that we record the passing of the following Amateurs:

VK3NS—Ross Bennett.

VK4JF—Jack Files.

VK6MU—Mal. Urquhart.

OBITUARY

JOHN DUNCAN, VK3VZ

Amateur Radio has lost a very good friend by the passing of John Duncan, VK3VZ, on 18th July, 1967, aged 53 years.

Belonging to a family who built things, his particular flair was the building of radio receivers and transmitters. This led him in the war years to join those Amateurs who had the necessary knowledge and drive to provide many of the early sets needed by the Armed Forces.

He used to tell lively tales of changing coils on transmitters during Darwin thunder storms while lightning played around on the rhombics.

Returning to civil life, he joined his father and brother as master builders, but retained his love for radio.

In the great boom of Amateur Radio in the post war years, his was a well known call sign—one that always turned up when something needed to be done.

The Wireless Institute of Australia owes much to his enthusiasm, as a Divisional Councillor, as Technical Editor of the Magazine, and as un-official trouble-shooter in many jobs, such as underpinning the rooms of VK3 headquarters. The Institute showed its appreciation of him by electing him an Honorary Life Member in 1954.

He was a famous transmitter hunter and also had the satisfaction of being the first transmitter-hider to completely baffle the hunters. Before television was known to Victorians, he was one of those who toiled all night before a models exhibition where the W.I.A. had pride of place featuring Amateur Television in operation.

He married rather late in life, but managed to find time, without ever neglecting his family ties, to continually build better transmitters and receivers. His signals were always good, and it was a pleasure to contact him. He was always vitally keen on what he was doing himself, but was equally willing to give understanding advice and help with the other man's problem. He was a generous, cheerful Scot who did not spare himself.

It was a privilege to know him, and to work with him.

JACK CRAWFORD FILES, VK4JF

The VK4 Division was saddened to learn of the passing of Jack Files, VK4JF, on 20th July after several months' illness. He was born in Brisbane 60 years ago and worked for Victoria Cross Manufacturing Co. almost all his life.

Jack took an interest in Amateur Radio many years ago and in 1931 was a member of the South Brisbane Radio Club, obtaining his licence on 1st December, 1932.

For the past 18 years Jack has been in charge of the inward QSL Bureau and served on Council of the VK4 Division. All Amateurs in that State are well aware of the excellent job he has been able to do—a fine example of service to fellow Amateurs, and many of the cards handled this year were sorted at his bedside, both at home and in hospital.

Jack took an active interest in Church work, and his kind, gentlemanly and friendly manner was a practical example of the high ideals he practised towards his fellow men.

When Jack did find time to operate his station he preferred c.w. and mostly home made equipment. The call sign VK4JF is known all over the world and has appeared on all cards passing through the QSL Bureau for the last 18 years. Perhaps Jack has not been as active as some, but no doubt is better known than most.

The W.I.A. was represented at the funeral service which was held at Ann St. Church of Christ and members formed a guard of honour following this service.

To his sorrowing wife and son Jack, a sincere thank-you for assistance with the QSL Bureau, and we extend our deepest sympathy in their sad loss and can only hope that the hand of time will help to ease the strain of his passing.

MAL. URQUHART, VK6MU

It is with much regret that we record the passing of Mal. Urquhart, VK6MU, on 27th July, 1967, at the age of 62.

VK6MU was a household call all over the world. Since he retired a couple of years ago, he had been on a world trip. His sudden passing will leave a gap, very hard to fill.

He always had an active interest in Amateur Radio. About twelve months ago he organised "an old timers" get-together and was already working on this year's event. It is now over forty years since he interested himself in Amateur Radio and has always kept it in the forefront of his activities.

Our condolences go to his wife and two daughters left to mourn his loss.

HUNTER BRANCH

The Command receiver which surely must be known to Amateurs in all parts of the world is a very versatile piece of apparatus, but its true versatility was revealed very convincingly at the July meeting of the Branch. Gordon 2ZSG came out of hiding at last and gave his long promised talk on the most popular conversions for this receiver and he displayed sets of all the frequency ranges including the broadcast band type which is quite rare in Australia. With the help of S.w.l. Arie Oosterveen, who did the draughtsmanship, Gordon supplied each member of the large audience with a booklet outlining all the conversions supplied. These ranged from the simple b.f.o. and volume control addition to double conversion for super selectivity.

No doubt the surplus Commands lying about in the shacks of Branch members will now be put to use in a much more efficient manner than they had thought they could be. In fact it would be true to say that the designer of these sets would be amazed at some of the modifications outlined by the lecturer. Some copies of the circuits are still available and Gordon will dispense these to postal enquirers if they are needed. In addition to the lecture, we were fortunate to obtain from the Japan National Railways a film of the features of the super express "Hikari" which makes the rapid journey from Tokyo to Osaka at two miles a minute. So it appeared that the audience was well pleased with the night's activities.

Plans are now well advanced for the Branch Field Day which will be held this year at Bolton Point Park on Lake Macquarie on October 15. There will be a full programme of transmitter hunts on both 2 and 40 metres and competitions and amusements for the other members of the family. The registration fee of $1 per adult or $2 per family will, this year include a lunch to be served in the hall at the ground and there will be some suitable liquid refreshments as well. More detailed information will appear in the Divisional Bulletin.

The Westlakes Radio Club conducted a most successful Field Day on 9th July and a small but enthusiastic group of Amateurs and Y.R.S. members made short work of finding all the hidden transmitters including the small transistor v.h.f. rig hidden by Tony 2ZCT in some very unlikely places. Wet boots seemed to be the order of the day in this regard! And while speaking of the club, a great deal of activity has been evident of late with work on the new aerial mast proceeding at a fast rate. The base block weighs something like two tons so it should be a difficult task to push it over. The mast will carry some v.h.f. aerials including a colinear for 146 f.m. It is hoped that this will result in good signals being received over much of the Newcastle, Lake Macquarie and Port Stephens areas on f.m.

The latest form of contest activity is a v.h.f. scramble to follow the Monday night broadcast on selected days. The winner and placegetters will be awarded points for their scores and these will total to give some lucky operator the prize to be given at the Annual General Meeting. Short wave listeners may also take part in the scramble and all logs should be sent to the Secretary, 15 Marine View, Newcastle, not later than the Friday following each contest. The first of these events was held on 24th July and further contests will be announced during the broadcasts.

The October meeting of the Branch will be held as usual and once again this will take the form of a series of lecturettes with the title of "Do It Yourself". This will be a contest to decide who has the most praiseworthy piece of equipment, the vote being made by those present. In case you've never been to a Hunter Branch meeting, the room is No. 6 in the Clegg Building, Newcastle Technical College, Tighes Hill, with the time of commencement—8 p.m. The September meeting is on Friday 1st and the October gathering on Friday 6th. Visitors are always welcome, so why not come along. 73, 2AKX.

CENTRAL COAST RADIO CLUB

A programme of wide interest was the feature for the July meeting of the Central Coast Radio Club. Ern 2EH recently made a tour of the Snowy Mountains project and took a number of colour slides. At the meeting, Ern gave an interesting run down, by his slides, of the latest developments in the area.

Another interesting item was a taped message from Laurie 4ZBL on life and communications in the Thursday Islands. Following playing of this tape, a reply from the meeting was recorded to be returned to Laurie.

The final feature of the evening was the discussion of a question on antennae from a recent Amateur Operator's Certificate of Proficiency examination. 73, Bill 2TS.

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VICTORIA

The Victorian Division is holding another membership drive, membership has increased over the past few months: April 977, May 999, June 1023. From these figures for membership over the past few months it appears to be successful. If you are not a member, why not join now. Remember the Institute's aim is to help Amateurs, and you can help the Institute by joining.

VICTORIAN DIVISION ANNUAL DINNER

The Divisional Annual Dinner this year will be held on 3rd November at the Oriana Room, McClure's Restaurant, St. Kilda Road. Charge is $5.50 a head which includes pre dinner savouries and sherry. A band will be engaged for 8-11 for those wishing to dance the light fantastic. Listen to the Divisional broadcasts for further details and booking arrangements.

The Divisional rooms are looking rather brighter and more welcoming now that the long overdue painting and redecorating has been completed.

The August general meeting was a surprise with over 30 members and visitors present to hear Fred 3YS give his talk and demonstration on the tuning and adjustment of s.s.b. transmitters using a two-tone oscillator and c.r.o. The talk and demonstration was very informative and was thoroughly enjoyed by everyone present. The evening was concluded by every one having a cup of hot tea or coffee.

The guest speakers for general meetings for the remainder of the year are:

Sept.: Les 3ZBJ with a repeat of the excellent lecture he gave to the V.h.f. Group entitled "A New Look at V.h.f. Technique—doing it with Semiconductors".

Oct.: Ian Sash, of the Defence Standard Laboratories will talk all about "Field Effect Transistors".

Nov.: Roy Humphries also of the Defence Standard Laboratories will talk on the "Design of Power Supplies using Semiconductor Rectifiers."

FURTHER I.T.U. DONATIONS

T. R. Naughton, 3ATN, $10; D. Harkin, 3ADJ, $5; J. Mitchell, 3ZMI, and F. E. Hobson, 3ZEU, $2 each.

73, Cyril 3ZCK.

EASTERN ZONE

Have not too much news for the zone this month. The Overseas Zone DX Certificate, which was brought into being at the Convention is being well advertised by zone members on the h.f. bands. Peter 3AUO is welcomed to the zone and will be on s.s.b. shortly. Norm 3ANC and Cliff 3AIT have also joined in zone activity. Keith 3SS is holidaying in W land. We hope to hear from him on return. Graham is going s.s.b. and worked his first VE for some years.

Ten stations were on the Friday night (28th July) zone hook-up on 80 mx, including ZLs and VK7s. Jamboree of the Air activity will include 3AWV, 3AED, 3ZCG, 3QZ, 3ZAB and yours truly. We hope others will join in. 73, Albert Cash.

MOORABBIN AND DISTRICT RADIO CLUB

After many years of "exile" the club is returning to its birthplace—the City of Moorabbin. For some years now, the club has enjoyed facilities provided privately and we are indeed grateful to Laura Hall for putting

up with us for so long. Suitable alternative accommodation has been obtained in the form of an arrangement to share the club room facilities of the Moorabbin Baseball Club. At the time of writing, the date of changeover had not been set, but members will be advised in the club's newsletter "A.P.C."

The usual "natter" night is programmed for Friday, 1st Sept., and the monthly general meeting on Friday, 15th Sept., will be followed by a talk on Field Effect Transistors by Neil 3ZRT.

It has become quite common now for VK3 stations to be asked by DX stations if they are members of the club. This is because many overseas stations are seeking to become honorary members and win the club's handsome certificate.

Enquiries are still being received from local and overseas points for kits for the club's receiver project. Some excellent reports have been received on the performance of the companion 2 mx converter; and from "reading the mail" on 80 mx, it seems likely that converter kits for other bands will also be in great demand. Enquiries regarding any of the receiver project kits should be directed to the Hon. Secretary, Harold Hepburn, at 4 Elizabeth Street, East Brighton, Vic., 3187.

A transmitter hunt on Friday, October 6, will replace the "natter" night for that month and it is planned to hide a 2 mx rig alongside the 80 mx rig. Both rigs will be keyed continuously with the club call sign VK3APC with a long key-down interval. The mode on 80 mx will be the usual c.w., but m.c.w. will be used on 2 mx so that the v.h.f. clan who may not be equipped with b.f.o's will be able to track it down.

It is hoped that the use of two bands will attract a larger group of hunters. The hunt will leave from the club rooms at 8 p.m. and any suitably equipped Ham or S.w.l. may compete. Those without equipment will be welcome to ride as passengers.

Other activities planned are: Friday, Oct. 20, tape lecture; Saturday, Oct. 28, social evening; Friday, Nov. 3, practical night; Friday, Nov. 17, annual general meeting; Sunday, Nov. 26, car trial/barbecue/party; Friday, Dec. 1, "natter" night; Friday, Dec. 15, Xmas party.

73, Alan 3ASL.

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QUEENSLAND

TOWNSVILLE AND DISTRICT

Since last time we in our fair city have had the chance of seeing some VEs, Bill VE1AHK operating under the call sign of HP9FC/MM being in port while the R/V VEMA was taking on some supplies. Bill is the op. and the ship is doing geological survey of our Barrier Reef. Merv. 4DV did manage to take him around the various shacks, while yours truly took him sightseeing all the places around about including the local zoo to take snaps of the kangaroos which he had never seen in the flesh. They really turned it on for his camera. Peg VE4PE is roaming the north on a working holiday and going to be entertained by Evie 4EQ.

Happy to report that at least three will face the August exam., so here's hoping the paper is to their liking. I know that all wish them every success.

The local club is busy toying with the many ideas to try and raise finance to build their club house and try and beat Ipswich who already have theirs. So anyone wishing to have the club house bearing their name, here is the opportunity to send along the necessary "grand".

Allan 4PS still busy watching the satellites passing over with the Moon Watch Society, also journeying to the west to record the moon passing Mars, apparently North Queensland is the only spot where this can be actually witnessed, so here is hoping for cloudless sky at 7.15 p.m. on the night.

The Expo for Canada has many of the boys chasing the 100 contacts to get the award. Merv. has it in the bag, while Bert frantically watches for V0 to get his total. 73, Rob 4RW.

IPSWICH AND DISTRICT RADIO CLUB

The main event on our July Calendar was the Annual Meeting and Fifth Birthday Party which was held at the club house on July 11. The annual election of officers was conducted and we have a few new faces at the official table for the next twelve months. The new officers are Ron 4RG, President; Norm 4KO, Senior Vice-President; Philip 4ZPE, Secretary; Mrs. J. Lloyd, Treasurer; Bill WIA-L4001, Public Relations Officer; Wayne 4ZN, Station Manager.

Our outgoing President, Norm, presented his report on the club's activities and achievements

over the last 12 months and thanked all club members for their support. We were glad to welcome visitors in the person of Mrs. V. Jordan, M.L.A., our Vice-President; Mr. and Mrs. A. Simpson, Secretary of local W.I.A.; Mr. P. Brown, 4PJ; Mr. P. Radikoff; Max Vincent, 4ZMU; Trevor Connelly; and Mr. and Mrs. Eddie Bange.

A birthday cake made by Mrs. Kirke, mother of S.w.l. Malcolm, was the highlight of the supper table. The club's shack in miniature, right down to the colour scheme, was a feature of the cake, which was enjoyed by one and all.

The club's triband transceiver has now been installed in the shack and drew its first blood as VK4IO in a nine-station net on Monday, 10th July. Participants were from practically all over Queensland as well as two in VK9, not to mention club members.

We would like to welcome several new members to the club, including Mr. Clem Scott, 4DW; Mr. Rod Tow, 4TF; and Mr. L. Fall, and we hope they will join in the club's many and varied activities.

Wayne 4ZN has a big conversion job on his hands now changing his 6v. 40 mx mobile over to 12v. operation. A new car has been responsible for the extra work. Couple of local lads, namely Ron and Warren, were very popular recently while chatting away on 80 about transistorised power supplies, when they were overwhelmed by numerous ZLs calling for numbers in one or their national contests. It appears the first VK4 worked was worth 14 points, so it was open season on two sitting ducks. 73, Warren 4GT.

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SOUTH AUSTRALIA

The monthly general meeting of the VK5 Division was held at the club rooms to a little below average attendance of members and visitors, 85 to be exact, and in view of the coldness of the night, this was quite a good roll-up. The meeting was opened on time by our President, Murray 5ZQ, and with no Divisional business, very little Federal business, and no controversial subjects to discuss, the business side of the meeting collapsed with an audible sigh, and QSL cards and smoke-oh took over the meeting.

Rick 5ZFQ was the lecturer for the night and he chose as his subject "Six Semiconductor Oscillator Circuits" and as he is considered to be something of an expert in this field, the meeting settled back for an interesting and instructive hour and a half or so.

To say that they were not disappointed would be the understatement of the month, as Rick handled his six circuits along the lines of a juggler, tossing them on and off the blackboard with remarkable dexterity and knowledge, and together with answering a barrage of questions from the interested members, he also managed to keep up the interest even of those who might have been a little out of their depth at times. Fortunately for me, most of the lecture was on the blackboard and aside from posting the said blackboard over to the Magazine Committee, there is very little more for me to say—Cheers from VK6 and VK4. However, to keep the record straight, the six oscillators were the Unijunction—Chow—Phase Shift—Franklin—Ultra Audion—and a lamp flasher, with quite a time spent on the Unijunction. The applause that greeted the closing of the lecture was so spontaneous, that Murray did not find it necessary to ask anyone to propose a vote of thanks to the lecturer, a tribute to Rick's fine job, and members left for home at the witching hour of 10.30 p.m., well pleased with the night's entertainment, and definitely a little more "clued-up" on the subject of semiconductor oscillators.

Uncle Tom 5TL was a busy little bee at various times during the meeting. Firstly as Publications Officer, then as QSL Officer—due to the unexplained absence of the regular QSL Officer, George 5RX—then back to Publications Officer, and finally as "Chucker Out" when apparently a couple of night owls forgot that they had a home to go to. A real battler is our Uncle Tom.

Ernie Luff, WIA-L5080, from Elizabeth, was his usual sprightly self at the meeting, complete with brief case containing certificates and QSL cards he has acquired since 1925. I was particularly interested in the Klondike Award that he acquired recently, also in the first QSL card he received in 1925 from G5OY. Ernie was then in England, his homeland, and from what I read, a power in the s.w.l. game then. He claims to be 73 years young, but personally I would call the stewards in to make him produce his birth certificate, because he certainly does not look anywhere near it.

Wyk 5WM was an unexpected visitor to the meeting, and although he has been a member for many years his visits these latter years have been few and far between. As a matter of fact he was listening on his mobile and heard a couple of the boys say that they were going to the meeting, and having a free evening for once he decided to join in. The 53.1 Mc. net is proving useful in more ways than one!

Wayne Kitchener, the Associates' representative on the VK5 Council, is now beginning to realise just how hard it is to organise the Associate members into getting together at the pre-general meeting to talk matters over among themselves for their own benefit. He is also now realising just why so many enthusiastic past Associate members' representatives have fallen by the wayside in their efforts to get organised, finally giving it away as a bad job. Wayne is still enthuiastic about the job and can only repeat—The Institute wants to help you, if you want to help yourself.

Rick 5ZFQ is now a member of the Disposals Committee to help from the transistor sales angle and as most know, his work and experience on these small items will make his advice more than welcome.

Once again a reminder about the Electrical Workers' Licence. The application forms are available from the Electricity Trust of S.A. and the deadline will be upon you before you know it. He who hesitates is lost, and he who is lost will pay out spondulics for all matters electrical. None of us should have any difficulty in obtaining a "B" class licence, in fact nobody should have any trouble in getting some type of licence.

Our large and genial Minute Secretary, Treva 5ZIS, caused quite a commotion at his place of employment recently when he put his foot, and other portions of his anatomy, through the ceiling. One of my spies, who spends most of his spare time lurking in ceilings, tells me that Treva almost fell through completely and left quite an impression on the said ceiling. It is also said that he nearly fell on top of his boss, although just how the man "underneath" would have finished up is best left to the imagination—yours.

With the coming of winter months it is now "back to 80" and the first call of the migrators heard was that of Len 5ZF, and possibly by now Moss 5TU has arrived on the band, to say nothing of the rest of the gang who spend the winter months on "good old 80 mx".

Uncle Tom 5TL, our busy Publication Officer, has been out of stock of the VK call sign books and has already lodged an application for the next issue (well in excess of the last order) and hopes to be able to supply all and sundry. Naturally the time of delivery is not guaranteed at the moment, but October is the shot in the dark.

Also, if anybody is seeking to acquire any crystals through the Division, or would like some information on same, the man to seek out these days is the ex-President, Ross 5KF, who has taken over the job from Gilbert 5GX who is busy doing his usual best in other directions.

Although we have at least two boat owners in our midst (probably more for all I know), nothing has been heard lately about the price of fish, nor that a fish meal is available at any time. The only information I have is that Pete 5FM once said that the first few fish were pretty pricey, but the cost was decreasing as the catches increased.

An official invitation has gone out from Council to any members who might wish to "sit in" on Council meetings. This is a good idea and will certainly dispel any suggestions that Council has anything to hide, and show it is at all times willing to allow the membership to acquire inside information as to the running of the Division. Let's hope that they don't all roll up at once, although it might be a means of recruiting future Council members.

Strange what bits and pieces can be picked up just by listening around the bands. John 5ZZ is seeking bamboos "about 10 feet long" and has been advised by all and sundry of possible sources from Rundle St. to Port Adelaide. I would plump for Port Adelaide myself, but then I could be wrong, anyway what does he want the bamboos for?—could he be a prospective quad builder?

Can't help but notice the number of two-letter call signs now on 53.1 Mc. (the W.I.C.E.N. net) these days, mostly to and from work. Just to mention a few, 5RD, 5KF, 5KX, 5LT, 5TY, 5WK and probably many more scattered along the roads in various directions.

Brian 5ZNK is reported as having been on a trip to ZL land in connection with his association with the R.A.A.F., and if all is to be believed, he saw other things in addition to the R.A.A.F. activities.

Quite an uproar recently at a meeting when George 5RX, our worthy QSL Officer, announced in a very loud voice, for all and sundry to hear, that he had a card for me from Kenya —5Z4JH to be exact—and when the cheering and uproar had subsided, he delivered the punch line that the contact was on 14 Mc.—and—on s.s.b. I have managed to live down the shame and degradation of the whole thing, but just think of it happening to me, and, to make it worse, it looks dinkum. A joke about "The Thing" I can take, but anything dinkum is beyond a joke!!

I notice by the VK5 Journal that the Youth Radio Club activities are definitely on the increase in our fair State and that Bert 5EQ is still guiding the destinies of the Port Pirie Club. I notice with some surprise, the fact that recently the first interstate conference was held in Sydney, and also the comment from the VK5 Co-ordinator, Bob 5OD, to the effect that why was not VK5 informed or represented at this first Y.R.S. conference, and also why should we accept decisions, which may affect all States, made by a conference arranged by and attended only by VK2 and VK3. Quite a point I feel, and one which the "Wise Men from the East" could well consider next time a conference is mooted. (Nothing to do with the W.I.A.—Ed.)

Geoff 5TY, the grumpy Co-ordinator of W.I.C.E.N., reports that the Red Cross Society have asked for W.I.C.E.N. to take part in the coming State Disaster Plan. This plan is being organised by the Red Cross with the approval of the relavent government authorities.

I notice, with extreme gratification, that Phil 5NN, the doyen of the followers of "The Thing", opens his column in the July magazine with the comment that the notes on s.s.b. are being written whilst on vacation in VK3 and adds in brackets "of all places". Apparently whilst we may differ on our modes of modulation, we at least agree on the dangerous subject of VK3!!

Reading the VK6 notes recently—oh yes, I read other Divisional notes—I see that Ross 6DA was welcoming another YL to the Division, none other than VK6OV—no christian name mentioned, either by design or accident —and a c.w. expert at that. Well that rubs me out of a contact, she would have to be an expert on c.w. to copy my code, so I am told by several coarse types in VK5. Oh me, oh m, such is fate, always the bridesmaid, never the bride—or something!

Had a visit from Wyk 5WM the other day, and was initiated into the mysteries of his 6 mx mobile set-up in his car. Was quite impressive, and he tells that it is a wonderful way to keep in touch with the boys, especially when one is too busy to get on the air from the home QTH. He is very happy at Channel 2, and reckons that he should have gone there long before he did. I reckon he has shaken off some weight, although he strongly denied this and refused to even give me a hint of any diet he may be practicing.

Any chance of my achieving fame as a lecturer at Uncle Tom's (5TL) Black Forrest Methodist Church Men's Fellowship meetings has now gone down the drain. The date he picked for my debut was the only day in the year that I would be away from the State—in VK3 at that, Ballarat to be exact—so you can cancel your orders for eggs and tomatoes, etc., they won't be needed. Such is fate.

Had a ring this month from a chap who put himself right in my good books by announcing that he was a VK3, "one of Pincott's mob" to be exact, they all seem to say that when they ring. I suppose they think they will frighten me that way—and they always do!! Anyway, it was none other than Jed Kelly 3AFD —too close to 3AFJ for comfort—and I must confess that I forgot his christian name, but when I looked at the call sign book and saw it was J.—it immediately rang a bell. I am sure that somewhere along the line there has been a Jed Kelly in VK3 history, and me having a memory like an elephant, I never forget. He seemed to be quite a good sort of a chap, and I was sorry that I could not find an opportunity for an eyeball QSO, but I was in bed when he rang and my XYL was just recovering from a bout of pneumonia, so I had to make my excuses and leave it at that. Actually he was ringing to find out when there was a meeting, but he was a week too early, as he was leaving for home within a day or so. Better luck next time —Jed—You Beaut!

Talking of Pincott 3AFJ, and to be exact I never want to, but he always seems to intrude into my thoughts, I note with dismay that my old Division has again put their faith in him by electing him as their President. I think it time that I paid them another visit and had a go at getting rid of their Pincott complex. What has he got that I have not? Oh Yeah!

Throughout the many years that I have been listening on 7 Mc., I have heard some mighty signals when the conditions were good, but the other night I heard a three-way between ZL3MF, VK6BT and VK1FB, and believe me,

I have never heard such a signal as that of John 1FB. Bob 6BT was above the normal strength usually associated with VK6 signals on that band, and Dave ZL3MF was also at good strength, but 1FB seemed as if he was next door. It did not last for long, but whilst it did, the copy was unbelievable.

I suppose that one must be prepared for shocks and surprises in Amateur Radio, but the other night on 7 Mc. I passed over the usual S9 signal of Athol 5LQ and lo and behold he was not in contact with Jack 5LN but was talking to Frank 5FJ. Athol was having a technical discussion as to the fact that his XYL always read the evening paper and if and when he got around to reading any paper it was the morning paper—or vive-voce—and Frank countered by giving a highly technical description of how to half put up a ceiling, and then when it rains, how to cover it up pronto!

Most of the readers of the VK5 notes, always assuming that there are such readers, could be pardoned for thinking that I have a persecution complex with regard to such things as VK3, Pincott 3AFJ, the Magazine Committee as a whole, the VK5 Council, and sundry other pet hates. Naturally, not having been the victim of their machinations, it probably is hard to fully realise just how they plot and plan to secure my downfall, without ever providing me with sufficient proof to support my claims of victimisation. However, at last I am in a position to produce proof enough to convince even the most sceptic of readers as to the truth of my complaints. Now I ask you, who is responsible for the magazine?—VK3! Who is the Editor?—Pincott 3AFJ! Who prepares the magazine?—the Magazine Committee! Who pays the Divisional dues for the magazine?—the VK5 Council! Bearing all this in mind, why did I not receive my copy of the magazine for July- and why, when I happened to mention it to Council member Uncle Tom 5TL over the telephone, did the telephone start ringing frantically within the next half hour or so, and when I answered it, the honeyed voice of the VK5 Treasurer, Harry 5MY say, "Having some trouble with the magazine, old boy?" Also, as a clincher, why did the magazine arrive next day, and as an added insult, have written in big letters on the back of the wrapper—"S.W.A.L.K.," which for the benefit of the uninformed means "Sealed With a Loving Kiss".

Gentlemen, I rest my case, and if they are not a lot of stinkers, what are they? Don't answer that. You beaut! What a gift from the skies, almost as good as striking Tatts, or even the local lottery—well almost!!

73, de 5PS, PanSy to you.

WESTERN AUSTRALIA

Greetings from the wet side of the black stump—brrrrrr I hate this winter, give me the summer any time! Perhaps I shouldn't say that, because it's winter conditions which usher in some interesting contacts on 80 mx of an evening.

40 metres seems to be giving a good account of itself too. Only a couple of Sundays ago I can distinctly remember taking part in a "round table" in which some eight or nine stations took part. It was a real "talkathon", as one station dropped out, another popped up to take his place. Among those responsible were VKs 3AAO, 5SS, 5ZZ, 2BAI, 2KD, 6BT, 6KJ (portable aboard M.V. Kangaroo) with 6NJ and 6MF mobile on the outskirts. 2KD, by the way, was running 18 watts to a base loaded whip!

There is currently here in VK6 a renewal of interest in 160 metres. This is mainly due to Cliff 6NK who has had considerable experience and success on this band in the U.K. Cliff was on hand at a recent Council meeting to give of his knowledge on "Top Band" and several other aspects of Ham Radio. Many chaps seem to shy clear of this band mainly because of the old bogey of the length of antenna required, but after a few words with Cliff, and indisputable evidence in the form of QSL cards, this excuse no longer holds good. Looks like a bit more construction work ahead for some. John 6ZW is getting in early by including 160 mx in his new sideband rig.

Talking of new sideband rigs, was lucky enough to be able to visit Narrogin recently and visit Pat 6PH at his QTH. Pat's home brew transceiver looks pretty good—sounds okay on the air too!

Len 6LG is putting in a bit of time at the work bench too, watch for this one.

Popular (?) rumour has it that a couple of blokes out Leederville way are putting in some crafty work on the side too.

It was nice to hear a couple of new call signs on the 6 mx a.m. net, welcome to Michael 6ZCW and Frank 6ZFN; hope to hear more of you.

May I extend, on behalf of all members, best wishes to VK6WS "Skipper" Schofield, who added yet another year to his already formidable tally. "Skipper", now 93 years young, is still active on 6 mx where he maintains several skeds each day. By the thoughtful action of Bill 6WY, "Skipper" was able to talk to many of his friends after the regular call back, shortly after his birthday. He must surely be the oldest active Ham.

Vic 6VK is back on the breeze from his new QTH, must be like old times to be back in them there hills. Judging by comments and questions I have heard being directed at you Vic, it seems as if your recent lecture and demonstration have created quite a lot of interest in r.t.t.y.

Among the visitors at the July meeting were John Moran and Tom 6TH and Cyril 6CN (now a city dweller I believe). Keep an ear out for Tom on the 6 mx f.m. net you Bunbury boys and anyone else too for that matter because Tom is toying with the plan to put the unit in his aircraft.

It looks almost certain that as a result of Clem's suggestion, we will soon be having an outdoor social gathering for the whole family. This is due in no small measure to the ground work being done by Graham 6ZEZ and Ken 6ZBT. Please give them YOUR support.

"Oh he floats through the air with the greatest of ease," this could well be true of Peter 6VR. I understand that he tried conclusions with a couple of visiting experts in the sport of Judo while they were visiting us from JA land. It's all in the way you land I'm told. How true!

Cheers to you all and hope to see you on the bands soon. 73, Ross 6DA.

HAMADS

Minimum 50c for thirty words. Extra words, 2c each.

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FOR SALE: Brand new assembled Heath HA-14 Linear Amplifier with 6 x 10 x 11 inch a.c. power supply unit, 2000 volt d.c. output, professional finish, $225. VK2ANO, Lot 16, Koorabel Ave., West Wollongong, N.S.W. Phone 26527.

FOR SALE: Collins Ham band Receiver, 75A-2, with crystal calibrator and handbook, $200. Brinkley, 9 Faunce Cres., O'Connor, Canberra 2601.

FOR SALE: Transistor Receiver, VK3APC design, 80, 40, 20 mx bands, 12v. d.c., professionally built, $95. L. A. Grant, VK3HI, 2 Wellington St., Lower Templestowe, Vic. Phone 850-3773.

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SELL: National NCX3 3-band s.s.b. Transceiver, with matching a.c. p.s.u., $300. Cmdr. Lloyd, R.A.N. Air Station, Nowra, N.S.W., 2540. Phone Nowra 20381 Ext. 389 (working hours) or 529.

SELL: Swan 350 Transceiver, 100 Kc. calibrator, Swan A.C. Power Supply, perfect condition. Heathkit 610 Monitor Scope, little use. Bill Yates, VK3AHS, 26 Henry Street, Highett, Vic., 3190. Phone 95-1967.

SELL: Tape Deck, Collaro Studio, new condition, $20. Corner Vented Enclosure, natural wood polished, fitted 12 and 5 inch speakers, $40. Hear both above working. VK3AGC, C. Ewin, 55 Dendy St., Brighton, Vic. Phone 92-6218.

WANTED: A new S.T.C. Carphone converted to 146. All plugs xtals and manual avail. Good price for good job. VK2ZMU.

WANTED: Prop. Pitch Motor or Beam Rotator. Sell: 800 cycle Mech. Filter, 75A4, $50 o.n.o. T. R. Naughton, VK3ATN. Phone A.H. 264 Birchip, Vic.

WANTED: Pye Reporter converted for 53.1 Mc. with crystal and power supply, or 6 metre transmitter only. Will pay freight. E. Blackburn, 623 Dudley St., Rapid Creek, Darwin, N.T., 5792.

WANTED: S.s.b. Transceiver, 40 mx single band or three-band, with d.c. matching power supply. R. Bradshaw, VK3SX. Phone 82-2152 (Melb.).

WANTED TO BUY: Calibrated Remote Control V.f.o. Lafayette model or similar. Output 80 mx, 40 mx. F. Clark, 93 Hughes St., Deniliquin, N.S.W.

WANTED TO BUY: Command Receiver, 3-6 Mc. VK3GX, Phone 870-7040 (Melb.).

WANTED TO BUY: 2 mx AM Transmitter, around 100w. or more, with or without power supply and/or modulator. Also wanted for Folk Museum, neutrodyne or other early B/C receiver. VK3BM, Bruce Mann, P.O. Box 135, Phone 10, Quambatook, Vic.

WANTED TO SELL: Moorabbin (APC) all-transistor Receiver with full instructions, nicely wired, but not fully tested, $70. Tech VTVM, complete with r.f. probe, as new, $50. Twin-tub Stainless Steel Sink with brass waste pipe, etc., never been used, bargain at $20. Quantity of ¼ inch aluminium tubing, 8-10 ft. long, 20c length. Tow-Bar, suit Austin, $2. Wanted to Buy: Co-axial Relay to operate on 12 volts. VK3LC, A. W. Chandler, 1536 High St., Glen Iris, Vic. Phone 50-2556.

WANTED: Used Amateur Receiver, Hammarlund HQ170 or 170A, or Collins 75A1-4. All letters answered. Full details and cash price required to G. N. White, 578 South Road, Glandore, S.A., 5037.

A LARGE RANGE OF TRANSMITTERS, RECEIVERS, TEST GEAR, AND DISPOSALS RADIO PARTS AVAILABLE

★ **SOLARTRON CD513/2 OSCILLOSCOPE**
"Y" Amplifier, d.c. to 10 Mc. Max. sensitivity, 1 mV./cm. Directly calibrated "Y" Amplifier attenuator. Time base, 0.1 usec./cm.-0.1 sec./cm. in seven ranges. Coarse and fine controls calibrated in time/cm. Employs 4" flat face PDA c.r.o. tube. Internal or external triggering. A precision instrument. $250.00 plus freight.

★ **EICO 753 S.S.B. TRANSCEIVER**
Triband 80, 40, 20 metres. Solid state VFO. VOX/PTT operation. Receiver offset tuning (10 Kc.). 180 watts p.e.p. S.S.B. Kit $328.78 inc. tax.

★ **PRECISION LOW FREQUENCY CRYSTALS**
1500 c.p.s., vacuum mounted, octal based. 0.001% accuracy. At a give-away price of $10.00 ea. (Limited quantity).

★ **TRANSCEIVERS, TR1986-7**
115-145 Mc. Employs heterodyne exciter in transmitter. TT15 p.a. Single xtal locks Tx and Rx on same frequency. In-built modulator. Supplied with 4.86 Mc. xtal. $30, circuit $1.

★ **SR550 DUAL CONVERSION COM. RECEIVER**
160 metres to 6 metres, Amateur Bands only. 3.5 Mc. xtal band edge marker, xtal supplied, product detector for s.s.b. $240, 10% discount for cash.

★ **PERSPEX SHEET**
1/16 inch thick. Size 4¾" x 16". 50c per sheet.

★ **VALVES**
EF50, 20c ea.; 7C7, 10c ea.; CV131, 6CQ6, 50c ea.; 6AC7, 20c ea.; 6AL5, 20c ea.; 6C4, 6AM5, 50c ea.; 6J6, 50c ea.

★ **METERS, P25 TYPE**
0-500 uA., $5.25; 0-100 uA., $6.95; 0-1 mA., $4.50; 0-10 mA., $4.50; 0-50 mA., $4.50. Full range of Meters and Multi-Testers available.

WANTED TO BUY

Communication Receivers, Test Equipment, etc. Call, write or phone. Equipment inspected and picked up at your convenience any night or week-end.

★ **MINIATURE CAPACITORS**
New shipment. 600 v.w. Values: 0.001, 0.02, 0.005, 0.0005, 0.0002, 0.0001 uF. $2 for 80, plus freight.

★ **SWITCH POTS**
Miniature transistor radio type pots. 2 megohms and 5 megohms. 12c each or 10 for $1.00.

★ **SPECIALS**
New 815 valve, $1. New DA41 (TZ40), $1.50.
7-pin skirted Valve Sockets, P.T.F.E. insulation, silver plated, only 20c each, c/w. shield.
9-pin skirted P.T.F.E. Valve Sockets with shield, 50c ea.
3 uF. 1000v. d.c. Block Capacitors. Only 25c each or $2 per dozen

★ **TELEMAX T75 FREQUENCY METER**
75-1000 Mc. Internal 5 Mc. Crystal Standard. V.h.f. version of BC221. As new condition. $150.00 plus freight.

★ **MARCONI TF1168/1 HIGH DISCRIMINATION OSC.**
138.9 to 161.1 Kc. in 1 c.p.s. calibrated steps. Excellent condition. $150.00.

★ **CAPACITORS**
Block Type: 10 uF. 750 v.w., $1.50 ea.; 6 uF. 750 v.w., $1.25 ea. Electrolytics, can type: 16 uF. 500 v.w., 50c ea.; 8 uF. 500 v.w., 40c ea.

● **A111 9 Mc. SOLID STATE S.S.B. EXCITER**
Incorporates vox amplifier, mic. amp. and relay amp. Specifications: 10 transistors, 9 diodes. Filter, xtal KVG XF9A. Carrier suppression, >55 db. Sideband damping, 45 db. Supply voltage, 12 volts ± 10%. Audio frequency response, 350-3,000 c.p.s. Mic. input, 1 mV. on 5KΩ (for low impedance mic. 50-300Ω).
Price $120.00

● **A112 5 Mc. SOLID STATE V.F.O.**
Freq. coverage: 4950-5550 Kc. Freq. stability: Long Term, 100 c.p.s. in 12 hours; Short Term, 200 c.p.s. to warm up. Output: 350 mV. on 220Ω load.
Price $22.00
With A111 and A112 combination operation is possible on 80 and 20 metres.

Available soon! Solid State all-band mixer and driver to drive 500w. nal.

★ **PETERSEN RADIO (U.S.A.) 100 Kc. XTAL CALIBRATORS**
Comprising 1 transistor 100 Kc. osc., 1 transistor emitter follower. Fibre glass printed circuit board. Provides accurate harmonics to 144 Mc. Trimmer on oscillator for zero beat with WWV. Xtal accuracy 0.005%. Power requirements, 15v. d.c. at 14 mA. Size 2½" x 1¾". $22.00 inc. tax.

★ **CRYSTALS**
Personal shoppers only, $1 each.

★ **MILLER 455 Kc. PRE-WIRED I.F. STRIPS**
Comprises two i.f. stages, diode detector, 55 db. gain, NPN silicon transistors, d.c. requirements 6v. d.c. 2 mA., size 1½ x ½ x ½ inch. $8.70 inc. tax.

★ **TR10A MULTIMETERS**
100,000 ohms per volt. Ranges, d.c. volts: 0.5, 2.5, 10, 50, 250, 500, 1K; a.c. volts: 2.5, 10, 50, 250, 1K; d.c. current: 10 uA., 1 mA., 25 mA., 250 mA. 10 amp.; resistance: 20K, 200K ohms, 2 megohms, 20 megohms. To clear, $25.95.

★ **POTENTIOMETERS**
Wire wound, 40c each; carbon, 25c each.

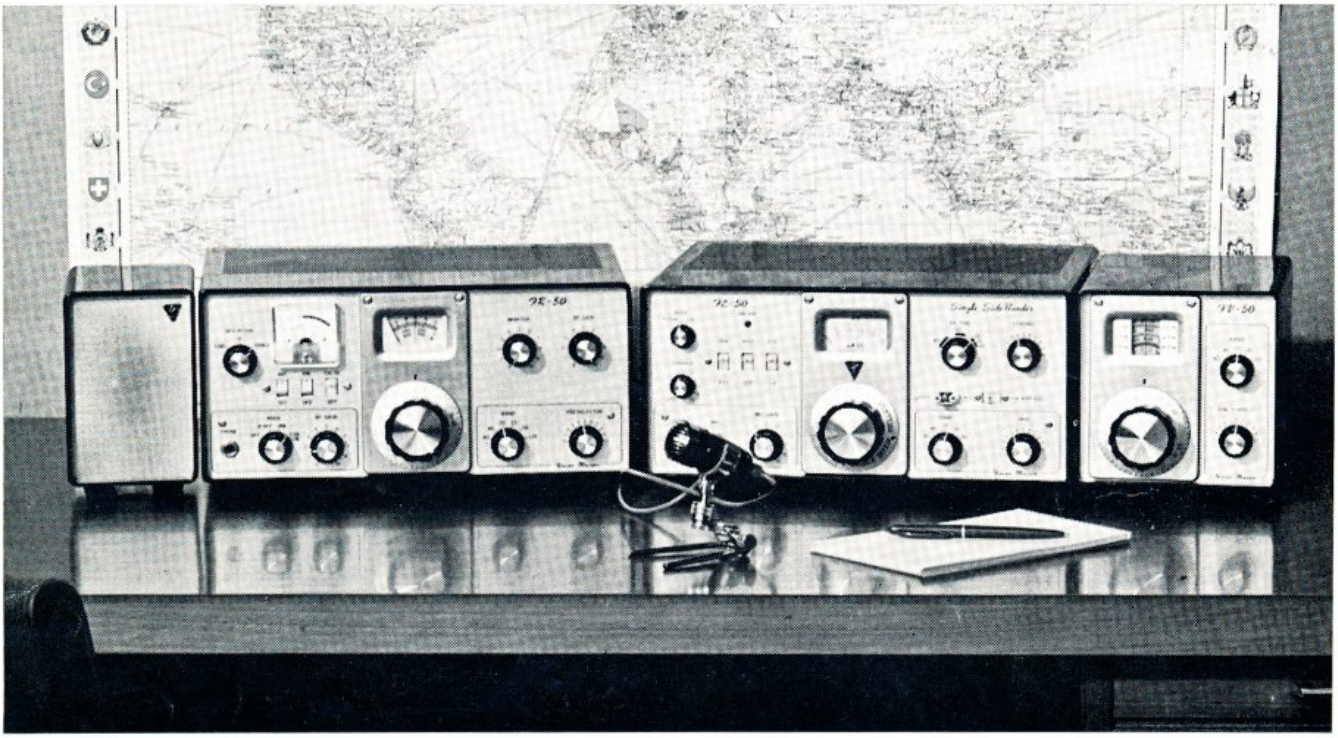
★ **RESISTORS**
¼ watt, I.R.C., Welwyn, Eire, Ducon, Philips, $2 per 100.

★ **416B PLANAR TRIODES**
Gold plated. Special. Ideal for 432 or 144 Mc. $4.00 ea.

ALL ITEMS FREIGHT EXTRA

UNITED TRADE SALES PTY. LTD.

280 LONSDALE ST., MELBOURNE, VIC. (Opp. Myers) **Phone 32-3815**



FIVE BANDS . . . SSB — CW — AM
Superb Performance at Moderate Cost

Yaesu "50" Series

This Series maintains the high engineering quality of other Yaesu products. Features include built-in solid state, voltage regulated power supplies (230v. a.c. 50 c.p.s. source); maximum accessibility with extremely neat wiring and layout; simple, safe transmitter tune-up procedure. Each unit can be used separately and is compatible with other equipment. Transmitter and receiver may be combined for transceiving. FV-50 V.f.o. is available for split frequency operation if desired. Cabinet colour black, panels etched satin aluminium.

FR-50 dual conversion receiver covers 3.5-4, 7-7.5, 14-14.5, 21-21.5, 28-29 Mc. (WWV and 100 Kc. calibrator optional). Pentode r.f., triode 1st mixer for sensitivity and low noise (0.5 uV. or 10 db. S plus N/N), c.c. 2nd osc. for stability, two cascaded 4 Kc. M.F's for selectivity, and a precision double gear dial with 1 Kc. readout (2 Kc. on 10 mx). Adjustable b.f.o. provides off-set tuning. Low drift h.f.o. becomes v.f.o. if linked with FL-50 for transceiving. Performance and features comparable with receivers of higher price class.

VALVES: 6BZ6 r.f., 12AT7 1st mixer, 6CB6 2nd mixer, 2 x 6BA6 455 Kc. i.f. amp., 6BE6 prod. det., 6BA6 b.f.o., 6AW8 audio with output 1.5w. to 4 ohms, 600 ohms and headphone. Two transistors for h.f.o. and buffer, one for c.c. 2nd osc. Diodes for a.m. det., a.n.l., a.v.c., power supply. Zener regulator.

PANEL CONTROLS: B.f.o., monitor, a.f. gain, r.f. gain, mode switch (off, std.-by, a.m., s.s.b., c.w.), a.v.c., a.n.l., calibrator on-off.

REAR CHASSIS: Ant., rcvr. mute, spkr. connection, osc. output, ground, accessory power outlet, a.c. power cord. Power requirement 230v., 50 c.p.s. a.c., at 50 vA. Size 6 x 13 x 10½ inches. Wt. 18 lbs. **Price $250** incl. S.T.

FL-50 is a complete five-band transmitter for s.s.b., c.w., and a.m. 50w. d.c. input. P.a. circuit engineered for high operating efficiency, employs adjustable pi network with low Z output, 50 to 100 ohms. Antenna relay is built-in. Five-crystal lattice filter with 5172.4 Kc. carrier crystal. Excellent audio quality transmission, easy to resolve. Carrier and s.b. suppression —50 db. Built-in v.x.o. enables approx. 10 Kc. shift, crystals extra by order. Separate v.f.o., FV-50, available for full coverage. Metered for p.a. current and r.f. output. P.t.t. control via suitable p.b. mic. Provision for v.o.x. A.l.c. circuit prevents overdrive. Simple, safe tune-up procedure with aid of 0-Max. carrier level control, enables re-insertion of carrier to any desired amount for tuning, and for a.m. or c.w. No need to balance out carrier for s.s.b., adjustment is pre-set. Ideal on c.w., straight or break-in operation.

PANEL CONTROLS: Operate-standby, power on-off, mic. gain, mode, carrier insert, netting switch, bands, grid tune, plate tune, ant. load, v.x.o., int.-ext. osc. selection, meter switch, crystal socket.

REAR CHASSIS: Ant. socket, key jack, bias adjust, rcvr. ant., v.f.o. input, accessory socket for rcvr. mute and linear control, accessory power outlet, ground, a.c. cord. All plugs supplied. Power 230v. a.c. 50 c.p.s. at approx. 100 vA. Size 6 x 13 x 10½ inches. Wt. 23 lbs. **Price $250** incl. S.T.

FV-50 V.f.o., gives full band coverage for the FL-50 where independent operation is required. Dial has same type free running precision gear drive as used in the FR-50, no backlash. Knob skirt is adjustable. V.f.o. ranges are 8.5-9.2, 12-12.5, 15.7-16.4, 22.7-24 Mc. and, with slight re-alignment, can be used for other 5 Mc. filter transmitters. Uses two transistors, built-in power supply. Can be powered with 12v. a.c. from FL-50 or from an external battery. Appearance matches FL-50, size 6 x 6 x 8½ inches. Wt. 7 lbs. **Price $59** incl. S.T.

SP-50 matching speaker; size 6 x 4 x 6 inches. Wt. 3 lbs. **Price $9.50** incl. S.T.

FOR THE MOST FEATURES —— CHOOSE YAESU

We stock "F" Series valves, diodes, matching speakers and spares. Also TA-33Jr tri-band beams $126, SWR meters, co-axial connectors, etc. All prices nett and include S.T., freight extra.

Prices and Specifications Subject to Change.

Obtainable from the Australian Agents:— BAIL ELECTRONIC SERVICES 60 Shannon St., Box Hill Nth., Vic., 3129. Ph. 89-2213